Mathematics 4

Module 9

Investigating Outcomes

Learning Technologies Branch

Alberta LEARNING

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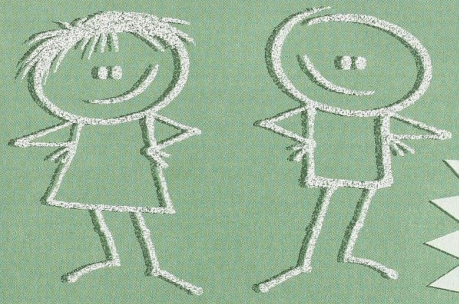
Investigating Outcomes



Note
A page providing information for the home instructor is included in this module.

Learning Technologies Branch

Alberta LEARNING

Mathematics 4
Module 9: Investigating Outcomes
Student Module Booklet
Learning Technologies Branch
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This document is intended for	
Students	✓
Teachers	✓
Administrators	
Home Instructors	✓
General Public	
Other	

The Learning Technologies Branch has an Internet site that you may find useful. The address is as follows:

http://www.learning.gov.ab.ca/ltb

The use of the Internet is optional. Exploring the electronic information superhighway can be educational and entertaining. However, be aware that these computer networks are not censored. Students may unintentionally or purposely find articles on the Internet that may be offensive or inappropriate. As well, the sources of information are not always cited and the content may not be accurate. Therefore, students may wish to confirm facts with a second source.

Mathematics 4

Module 1
Data Management

Module 2
Number Concepts and Patterns

Module 3
Fractions and Decimals

Module 4
Addition and Subtraction

Module 5
Multiplication

Module 6
Division

Module 7
Measurement

Module 8
Exploring Geometry

Module 9
Investigating Outcomes

Icons

The book you are presently reading is called a Student Module Booklet. You will find icons used throughout it. Read the following explanations to find out what each icon tells you to do.

Pay close attention to important words or ideas.

Refer to the textbook *Quest 2000: Exploring Mathematics*.

Use manipulatives, cut-out learning aids, or pull-out pages.

Do an activity to review the concept.

Use a calculator.

Prepare to do a Challenge activity.

Do an activity just for fun!

Do an activity with your home instructor.

Use the Internet.

Use the Answer Key to Self-Marking Activities in the Appendix to correct activities.

Information for the Home Instructor

Manipulatives

The student will need to have on hand (or make) spinners and six-sided number cubes in order to work through the activities in Section 1 of this module. Dice and spinners can be purchased from various commercial outlets and may be of better quality than those made by the student.

If spinners are constructed from the patterns included in the Appendix, it may be necessary to make adjustments to the actual centre spinner in order for it to spin freely.

The student will need to use coloured crayons to complete several of the activities in Section 1.

A brown paper lunch bag and several coloured squares, beads, tiles, or other similar small items will be required in the activities on probable outcomes.

Manipulatives may be required in the review of Modules 1 through 8. Refer to the Appendix sections of these modules to locate the manipulatives needed to review concepts. A basic collection of the students's own manipulatives (counters, base ten materials, geometric objects, measuring devices, a calculator, etc.) should also be available for use in the review section of Module 9.

Internet Sites

Suggestions for appropriate Internet sites have been included in this module. These sites may change over time, so it would be wise to preview the sites before the student uses them for extra practice or as a break from his or her regular work.

These sites may be accessed at any point in the module for review or practice and to extend student learning.

- **http://shazam.econ.ubc.ca/flip**
  Have fun playing an interactive coin-flipping game.

- **http://explorer.scrtec.org/explorer**
  Click on the Mathematics Curriculum button. Then select General Probability. Try How to Make a Spinner, Race to a Quarter, or M and M Graphing and Probability.

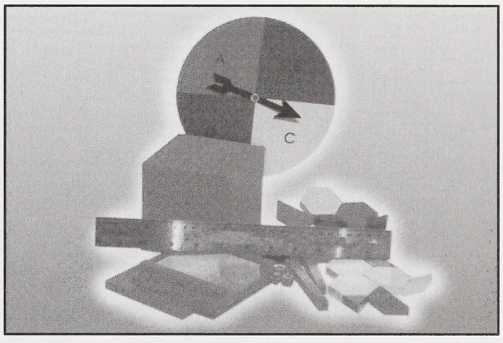
Basic Number Facts Practice

As Module 9 is largely a review module, and the student should be able to recall most basic number facts by now, the time for number facts drills has been decreased to 1 minute.

Information for the Student

The Grade 4 Mathematics course is designed to keep you actively involved in learning as you progress through the daily lessons in each of the nine modules. Besides the Student Module Booklets, you will also need a copy of the Grade 4 Mathematics textbook called *Quest 2000: Exploring Mathematics.* The textbook contains pictures, information, questions, and problems that are referred to in the modules. Each module also requires you to complete one or more Assignment Booklets to be sent to your teacher for marking.

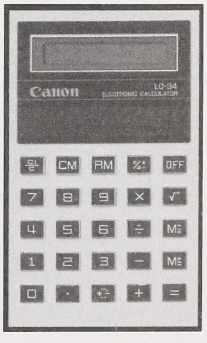
Manipulatives



Manipulatives are hands-on materials that you will be using to help you learn new concepts and ideas. They include things like base ten blocks, geoboards, spinners, counters, polygon shapes, tiles, rulers, and metre-sticks. Don't worry if you don't have all of these manipulatives. Some can be found in the Cut-Out Learning Aids section of the Appendix in several of the modules. Some you may be asked to make from materials found in your own home. However, it is highly recommended that you have a set of base ten blocks. They will be used often to help you to understand many new math concepts.

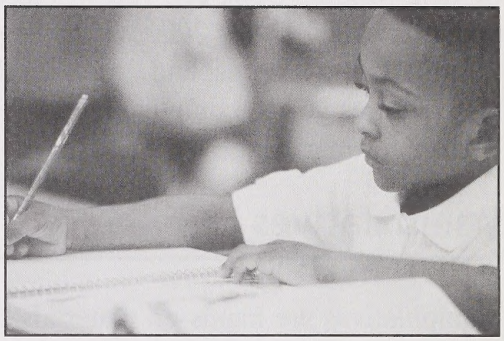
You should use manipulatives whenever you think they will help you understand something new you are learning. Manipulatives can also be useful when you are sharing or discussing what you know with your home instructor.

Calculators



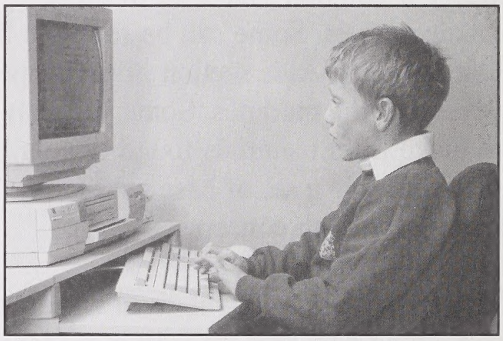
You will need a calculator for many of the activities in Mathematics 4. It is important to remember that a calculator is a tool to be used when doing difficult calculations and when investigating what numbers can do. Don't rely on the calculator for calculations that you can do in your head. For example, you would not use a calculator when estimating or doing mental math. Both of these activities rely upon mastering the basic number facts.

Basic Number Facts



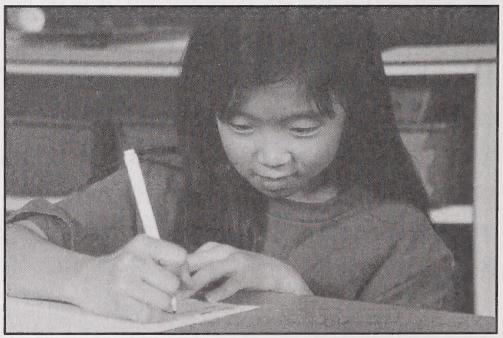
You will practise the basic facts on several days of each module. Each drill is timed to encourage you to work quickly. At first, you may not do very well because you may not know all of the number facts yet, or you may have forgotten some of the number facts you learned last year. Don't worry. By practising the facts regularly, your scores will improve over time. Strategies to help you learn the number facts will be presented in the lessons.

Computers



If you have your own computer at home, you may already know some computer software programs that help you to learn mathematics. There are also many websites on the Internet that provide math activities for students to do. Throughout this course, you will find optional activities that refer to software programs and Internet websites. You should do these activities only when you have finished the daily assigned work. **Note:** Always check with your home instructor before you log onto the Internet. **Remember that any Internet website address given in this module is subject to change.**

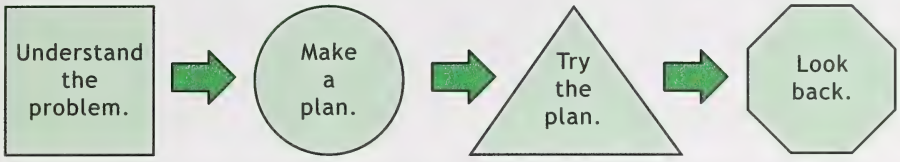
Journal Writing



In each Assignment Booklet, you will often be asked to complete a journal entry about something you have been learning in the module. Being able to put into your own words what you have learned is an important skill. It will help you think about what you know as well as help your teacher understand your thinking.

You are already familiar with problem solving from earlier grades. This course will continue to help you develop strategies to make you a better problem solver. There are four steps that can be used to solve most problems.

The Four-Step Process



Step 1

Understand the problem.

In this step, you need to spend time reading over the problem in order to understand what you are being asked to find. One way to see if you understand the problem is to cover it up and then try restating it in your own words. Sometimes it might seem like not enough information is given. If this happens, try asking yourself the question, "What do I already know that will help me solve this problem?"

Step 2

Make a plan.

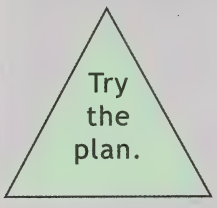
In this step, you decide on the method or strategy you will use to solve the problem. Different problems require different strategies. Most problems can be solved in more than one way. In this course, you will be looking at the following seven strategies:

- acting out the problem
- guessing and checking
- making an organized list
- drawing a diagram
- making a table or chart
- looking for a pattern
- making it simpler

You will be introduced to these strategies as you move through the modules. However, you may review each of the strategies at any time by turning to the Appendix of Module 1.

Remember, there is no one "right" way to solve a problem. The method or strategy you use may be different than the one your home instructor or someone else doing the problem would use. Sometimes you will find that more than one strategy on the list can be used to solve a problem. In fact, sometimes you may decide to invent a strategy of your own that is not even on the list.

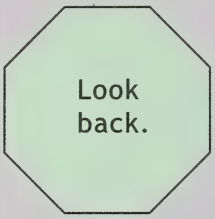
Step 3



In this step, you try out one of your strategies to see if it works to solve the problem. Don't worry if you can't find the answer immediately. Some problems take more than one step. You may also find it necessary to use your calculator to do some of the calculations.

Sometimes, as you try to solve the problem, you'll find that your strategy isn't working. Don't give up. Try another method instead.

Step 4



In this step, you take time to look at your answer and ask, "Is my answer reasonable? Does it make sense?" Writing your answer in a complete sentence may help you to see if, in fact, you have answered the question. If not, you may have to check your calculation for errors or, perhaps, try another strategy.

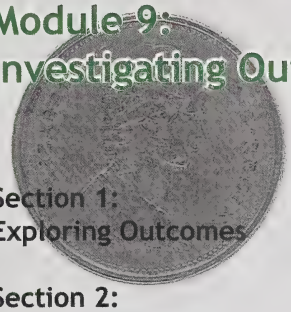
This is also a good time to look at the strategy you used and to think about how you could use it again in other problem-solving situations. Take time to share your strategies with your home instructor, and compare your method with the strategy your home instructor might use.

Remember, problem solving is a skill you need and will use throughout your life. The more practice you have with solving problems, the better your problem-solving skills become. Problems don't always have just one "right" answer. Some problems have several possible answers, just as some problems may be solved in several different ways.

Contents

Overview

Module 9: Investigating Outcomes



Section 1:
Exploring Outcomes

Section 2:
A Review of Modules 1 to 8

Module 9: Investigating Outcomes

Many games involve luck or **chance**. Understanding how **probability** works can help you make predictions about how likely it is that an event will happen.

In this module you will...

- try several experiments involving chance
- think about how likely or unlikely it is that a certain outcome will occur
- review what you learned in Modules 1 to 8

There are **two** Assignment Booklets for Module 9.
You should send in Assignment Booklet 9A after completing Day 6.
You should send in Assignment Booklet 9B after completing Day 14.

Section 1

Exploring Outcomes

What Is Most Likely to Happen?

Two teams are getting ready to play a game of softball. They need to decide which team will go up to bat first. One player pulled a coin from his pocket and said, "Let's flip a coin to decide. If it's heads, your team goes first. If it's tails, my team goes first."

Have you ever flipped a coin to help you make a decision? A coin has two sides. One side of a Canadian coin has a picture of Queen Elizabeth on it. This is called the **heads** side of the coin. The other side has a picture on it. It may be a leaf, a beaver, a ship, a loon, or a polar bear, depending upon what kind of coin you have. This side is called the **tails** side of the coin.


Heads

Tails

Heads

Tails

What is likely to happen when you toss a coin?

Find a coin and try this experiment.

- Toss the coin into the air and let it fall ten times.
- In the chart below, use tally marks to record how many times the coin lands on heads, on tails, or on its edge.

Note: Tallying is a quick way to keep track of your results. Tally marks are made with four vertical lines and a diagonal line for the fifth tally: 𝍸.

Heads	Tails	On the Edge
		

1. a. How many times did the coin land on heads when you tossed it?

_____

b. Is it **likely** or **unlikely** that the coin will fall with the heads side showing? _____

2. a. How many times did the coin land on tails when you tossed it?

_____

b. Is it **likely** or **unlikely** that the coin will fall with the tails side showing? _____

3. **a.** How many times did the coin land on its edge when you tossed it?

_____

b. Is it **likely** or **unlikely** that the coin will land on its edge?

_____

Check your answers in the Appendix.

You should have found that it is equally **likely** that the coin will fall with heads showing or tails showing. It is **unlikely** that the coin will land on its edge.

Tossing a coin is a fair way to decide who will bat first in a softball game because both teams have an equal chance of winning the coin toss.

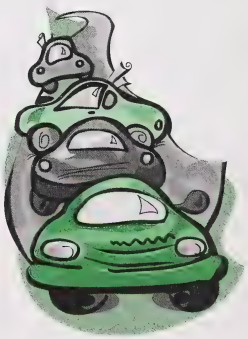
Note to the Home Instructor

This section of the module will reintroduce some terms used in the Grade 3 program. The terms *likely*, *unlikely*, *possible*, *impossible*, *certain*, *uncertain*, and *chance* (*equal*, *less*, and *more*) will be explained by example and should be used accurately as the student works through the activities on probability.

Chance

Taking chances is part of everyday life. Many of the things that you do each day involve chance.

Imagine that you are travelling to the grocery store in a car. While this seems like a simple task, you will actually take a number of chances. You take a chance that your car might get a flat tire. You take a chance that you may come across a detour or a traffic jam on the road. You may or may not find what you are looking for at the grocery store.



You take a chance if you go to visit a friend without telephoning first. Your friend may or may not be home.

4. Think of a time this week when you took a chance on something. Describe what happened.

_____

_____

_____

_____

_____

Check your answer in the Appendix.

Chance is a part of life. Some people call it **luck** rather than chance. For example, you might say that you were lucky that your friend was home when you went to visit, or that you had bad luck because your friend wasn't home.

Understanding how likely it is that a certain event will happen can help you make better decisions. Perhaps you know that your friend Amir usually watches television for an hour before supper. You choose to visit him then because you know that there is a very good chance that he will be home.

You take a chance when you dress to go outside on a summer morning. It might rain or it might not. Weather predictions help you dress suitably for the day, but the prediction may not always be correct.

It is possible for many different things to happen, but you can often **predict** which things are most likely and least likely to happen.

Some events are not likely to ever happen. They are called **unlikely events**. For instance, it is not likely that you will see your favourite movie star on the way to your friend's house. This is an **unlikely** event.

It is unlikely that you will find $1 million on the ground. There is almost no chance of that happening.

5. How likely is it that each of the following events will happen? Write **likely** or **unlikely** on the line below each event.

a. The prime minister will visit you at home.

_____

b. You will do schoolwork next year.

_____

c. A tornado will destroy your local school.

_____

d. There will be snowfall in the Rocky Mountains in the month of January.

_____

e. All Grade 4 students will be given free tours of Disney World next month.

_____

6. Think of two events or situations that are unlikely to happen in your life. Write them on the lines below.

_____

_____

Check your answers in the Appendix.

Events can also be classed as **possible** and **impossible.**

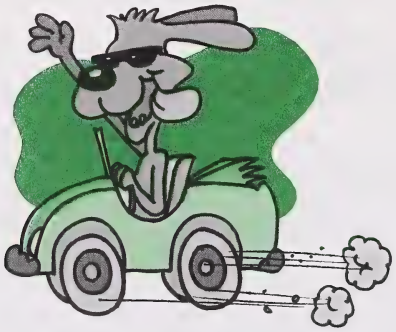
Look again at the events in question 5. Is it **possible** that any of these things could actually happen? Some of those events are not very likely, but in the right situation, they are possible.

Examples

- The prime minister could be related to you, so he might visit you. Or, perhaps, you have won a contest where the prize is a visit from the prime minister. Then it is **possible** that he could visit you.

- If the weather conditions were right, a tornado could occur in your area and destroy buildings. Although tornados are not usually that destructive in Western Canada, it is **possible** that this could happen.

Impossible events are things that could never happen. For example, it is **impossible** that a dog could drive a car.



7. Which of the following events are **possible**? Which events are **impossible**? Write the correct word in the blank.

   a. Many Canadian families will own a computer by next April.

   _____

   b. Elephants will read paperback novels.

   _____

   c. From a box of chocolates, you choose one that has nuts in it.

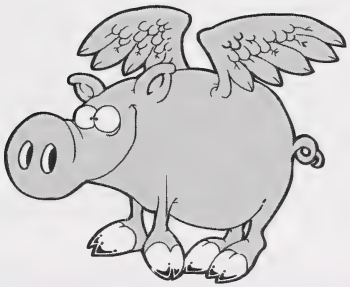
   _____

   d. Construction workers will dig a hole from Canada all the way through the earth to China.

   _____

Check your answers in the Appendix.

8. Think of an event or a situation in your life that would be impossible. (**Hint:** Think of something totally unbelievable!) Describe it here.



Check your answer in the Appendix.

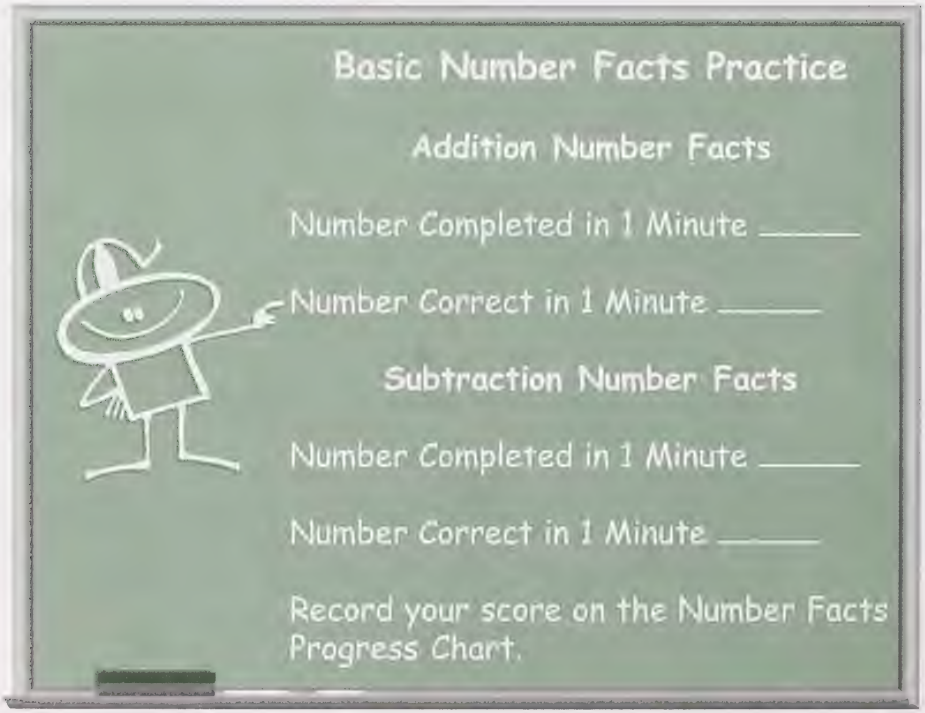
Remember the following ideas about chance:

- Events can be **likely** or **unlikely**.
- Events can be **possible** or **impossible**. Impossible events can never happen.
- You can sometimes **predict** how likely it is that an event will happen.

Basic Number Facts Practice

Turn to the Number Facts Progress Chart for Module 9 in the Appendix. Remove the chart from the Appendix and hang it in your study area. You will use this chart to record your scores for the number facts drills in Module 9.

Ask your home instructor to time you as you complete the following exercises. Your goal is to complete all 25 questions in each exercise in 1 minute. At the end of 1 minute, count up how many questions you were able to complete. Write this number in the chart below. Then use the answer key in the Appendix to mark the exercise, and record your score in the space provided. Before you move on, go back and complete any questions you did not finish during the 1 minute. Mark these questions using the answer key as well.



9. Addition Number Facts
Timed Exercise: 1 minute

5 + 8	3 + 9	5 + 7	2 + 8	9 + 9
7 + 6 =	5 + 9 =	6 + 5 =	2 + 9 =	8 + 4 =
8 + 8	6 + 3	9 + 4	7 + 8	6 + 6
3 + 8 =	5 + 6 =	3 + 7 =	4 + 7 =	6 + 9 =
4 + 8	5 + 8	9 + 3	8 + 2	7 + 7

Check your answers in the Appendix.

10. Subtraction Number Facts
Timed Exercise: 1 minute

12 − 6	18 − 9	15 − 7	11 − 4	17 − 9
13 − 8 =	15 − 8 =	16 − 8 =	13 − 5 =	10 − 9 =
14 − 7	15 − 9	12 − 7	17 − 8	16 − 7
13 − 7 =	12 − 4 =	11 − 9 =	14 − 8 =	15 − 6 =
16 − 9	12 − 5	13 − 4	12 − 3	10 − 5

Check your answers in the Appendix.

Turn to Assignment Booklet 9A, and complete the activities for Day 1.

Outcomes and Predictions

The result of an event is called an **outcome**. For example, two results or outcomes can happen when a light switch is flipped. The lights can be turned on or off.

When you buy a raffle ticket there are also two outcomes—your ticket wins or your ticket doesn't win.

1. What **outcome** or result is possible for each of the following events?

a. You ask your parents for a larger allowance.

_____

_____

_____

b. You draw one prize from a grab bag that contains rings and toy animals.

_____

_____

_____

c. You throw a cube with the numerals 1 through 6 written on the sides.

_____

_____

_____

Check your answers in the Appendix.

The words **likely**, **unlikely**, **possible**, and **impossible** describe how likely it is that an event will take place.

Events can also be described as **certain** and **uncertain.**

Example

There is a Grand Opening at a new electronics store in your neighbourhood. As part of the Grand Opening celebration, there are two special events. Visitors to the store will get a free CD and will also have their names entered into a draw for a new stereo.

If you visit the store on opening day, you will get a free CD. This outcome is **certain** because everyone gets the CD.

You will also have a chance to win the stereo. You may win or you may not. The outcome of the draw is **uncertain**.

Many other events have outcomes that are certain or uncertain.

- When you order food at a restaurant, a **certain** outcome is that you will get food. Whether or not you will like the food is **uncertain**.

- If you roll a number cube with the numerals 1, 1, 3, 3, 5, and 5 on it, you are **certain** to roll an odd number. All the numbers are odd. You are not certain of rolling a 3 because there are only two 3s on the cube. You may roll a 1 or a 5 instead. This outcome is **uncertain**.

2. For each of the following events, give a **certain** outcome. In other words, tell what is sure to happen.

a. You pick a snack from a tray of apples, oranges, and grapes.

_____

_____

b. You correctly add 7 and 6.

_____

_____

c. A bag contains six blue marbles. You pick two marbles.

_____

_____

Check your answers in the Appendix.

For the next activity you will need a number cube with six sides. If you do not have a number cube, go to the Cut-Out Learning Aids section of the Appendix and cut out one of the number cubes. Get your home instructor to help you put it together.

There are six possible outcomes when you roll the number cube. You could roll 1, 2, 3, 4, 5, or 6. No other results are possible.

You do not have a chance of rolling a 7 because there are no 7s on the cube. Rolling a 7 is an **impossible** outcome.

The chance of rolling a number less that 8 is **certain**. All the numbers on the cube are less than 8.

3. Look carefully at your number cube to answer the following questions. Remember what you have learned about **likely**, **unlikely**, **possible**, **impossible**, **certain**, and **uncertain** outcomes.

Tell if each statement is **true** or **false**.

a. It is **certain** that you will roll a number between 1 and 10. (Think: Are all the numbers on the cube between 1 and 10?) _____

b. It is **possible** to roll an even number. (Think: Are there any even numbers on the cube?) _____

c. It is **impossible** to roll a number greater than 7. (Think: What are the numbers on the cube?) _____

d. It is **unlikely** that you will roll an even number or an odd number.

_____

e. It is **most likely** that you will roll a 4. (Think: Do you have a better chance of rolling a 4 than any other number?) _____

f. You have the **best chance** of rolling a 1. (Think: Is it any easier to roll a 1 than any of the other numbers?) _____

Check your answers in the Appendix.

Testing Predictions

In Day 1 you learned that you can make **predictions** about how likely it is that an outcome will occur. It is often necessary to experiment or test predictions about outcomes.

Use your number cube to test the following prediction.

Prediction: You are more likely to roll a 3 than a 1.

Use the tally chart below to record the outcomes of the number cube rolls. For Trial A, roll the cube 20 times. If you roll a 3 or a 1, record it on the chart by making a tally mark. If another number is rolled, do not record it.

	Outcome of 3	Outcome of 1
Trial A		
Trial B		

4. **a.** How many times did you roll a 3 in Trial A? _____

   b. How many times did you roll a 1 in Trial A? _____

5. Was the prediction correct? _____

Check your answers in the Appendix.

Do another trial to test the prediction. Roll the number cube another 20 times. Record these results on the tally chart in the row for Trial B.

6. **a.** How many times did you roll a 3 in Trial B? _____

   b. How many times did you roll a 1 in Trial B? _____

7. Add the scores of both trials.

   a. How many 3s did you roll in all? _____

   b. How many 1s did you roll in all? _____

8. Is the prediction correct? Explain your answer.

_____

_____

_____

_____

Check your answers in the Appendix.

The more trials or tests that you do, the more accurate your prediction will be. Sometimes it is necessary to complete many trials to get an accurate prediction.

A good example of this is in the area of weather forecasting.

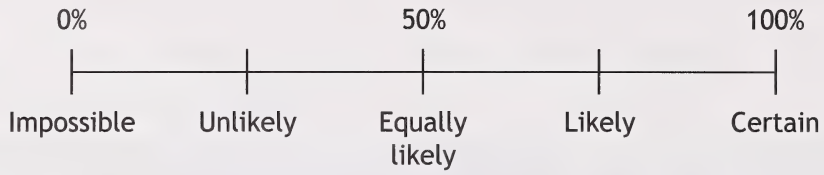
Scientists know how to make accurate weather predictions because they have watched the weather for years. Hundreds of weather "trials" have occurred and the results of certain weather patterns are known.

For instance, if it has been sunny and warm for several days and then a certain type of cloud starts appearing in the sky, weather forecasters might predict that it is **very likely** to rain that evening. This pattern of weather events has happened so many times before that they feel fairly sure that their prediction is correct.

Weather forecasters often use percentages to predict the weather. You may have heard predictions like these:

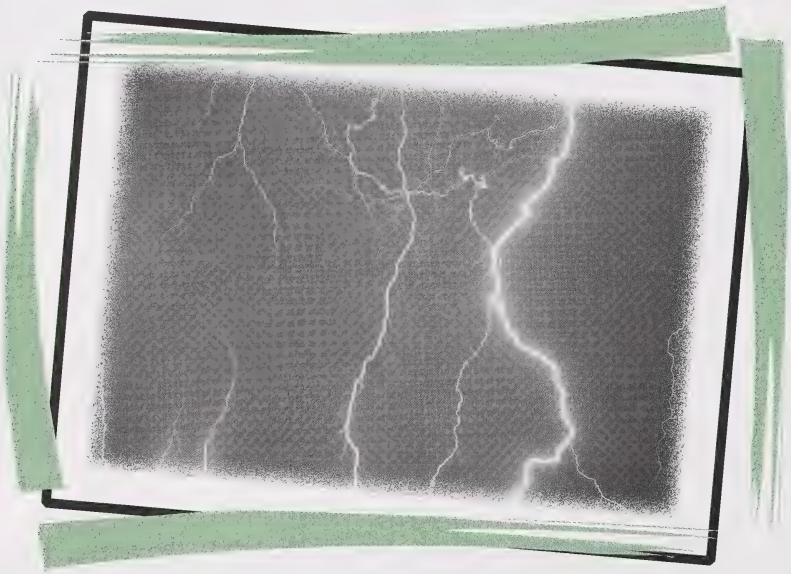
- There is a 60% chance of snow tomorrow.
- There is a 20% chance of rain showers today.
- There is a 95% chance of thundershowers in the area.

When percentages are used, it is a way of showing if an outcome is impossible, unlikely, equally likely, likely, or certain.



For example, if there is a 60% chance of snow tomorrow, out of 100 outcomes, 60 outcomes will be snow and 40 will be no snow. A 60% chance of snow is **more likely** than a 40% chance of no snow. It will likely snow tomorrow.

If there is a 95% chance of thunderstorms in the area, this means that out of 100 outcomes, 95 of them will be thunderstorms and 5 outcomes will be no thunderstorms. It is **almost certain** that there will be thunderstorms in the area.



When an outcome is certain, it is said to have a 100% chance of happening. This means that it will happen all of the time.

9. If the prediction is a 10% chance of hail, what is **most likely** to happen?

_____

10. If the prediction is a 50% chance of heavy winds in the area, what is **equally likely** to happen?

_____

_____

11. If the prediction is that there will be a 100% chance of sunshine, what is **certain** to happen?

_____

_____

Check your answers in the Appendix.

You will learn more about predictions in the next lessons.

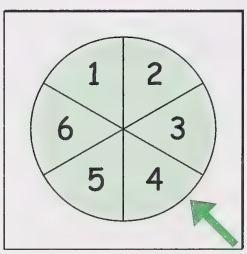
Turn to Assignment Booklet 9A, and complete the activities for Day 2.

Probability and Spinners

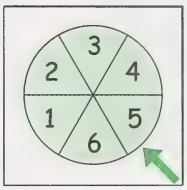
Today's lesson will deal with probability and predictions using a spinner.

Turn to the Cut-Out Learning Aids section of the Appendix and follow the instructions to make the large spinner.

Write the numbers 1, 2, 3, 4, 5, and 6 on the sections of the spinner. Use a pencil so that you can erase the numbers. This spinner will be used for another activity later on.



Practise using your spinner. Does the arrow point to different areas of the circle each time? Be sure that the spinner moves freely.



You will notice that the spinner has six sections. That means there are six possible outcomes every time you spin.

Use your spinner to do the following activities.

1. Spin the spinner. What number did the arrow point to? _____

2. List the other possible outcomes.

- _____
- _____
- _____
- _____
- _____

3. Use the words **possible**, **impossible**, **certain**, **uncertain**, **likely**, and **unlikely** to describe the following outcomes.

a. The arrow points to a 9. _____

b. The arrow points to an odd number. _____

c. The arrow points to a number that is divisible by 2.

_____

d. The arrow points to a number that is less than 7.

_____

e. The arrow points to a 4 three times in a row.

_____

Check your answers in the Appendix.

Making and Testing Predictions

Turn to the Cut-Out Learning Aids section of the Appendix. Make the small spinner and colour it.

Make a prediction about which colour the arrow will point to more often.

I predict the arrow will point to _____

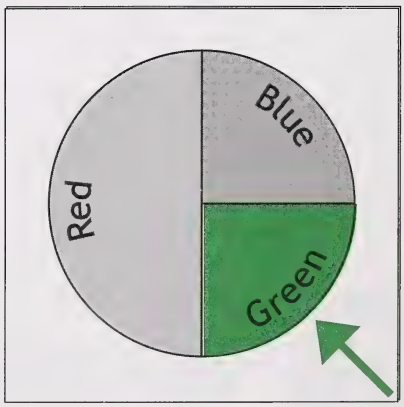
more often than _____.

Test your prediction. Spin the spinner 50 times. Use the following chart to record how many times the arrow points to each colour. Use tally marks.

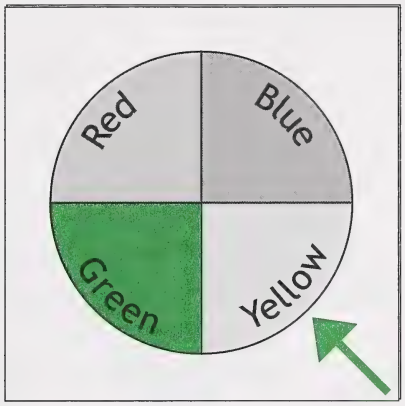
Red	Blue	Green

Was your prediction correct? _____

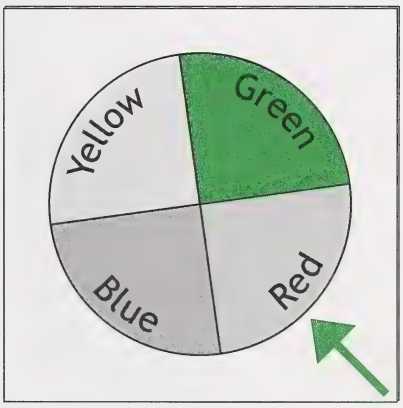
The probability of spinning red is one chance out of two, or $\frac{1}{2}$, because the red section covers $\frac{1}{2}$ of the spinner. The probability of spinning blue or green is $\frac{1}{4}$ because blue and green each cover $\frac{1}{4}$ of the spinner. One half is larger than $\frac{1}{4}$, so the spinner should land on red more often than on blue or green.



You will notice that this spinner has four equal sections. Each section is a **fraction** $\left(\frac{1}{4}\right)$ of the whole spinner.



There are four possible outcomes because there are four sections on the spinner. The chance or probability of the arrow pointing to the red section is **1 chance in 4**, or $\frac{1}{4}$.



The probability of the arrow pointing to blue is also **1 chance in 4**, or $\frac{1}{4}$.

4. What is the probability of the arrow pointing to the yellow section?

5. What is the probability of the arrow pointing to the green section?

_____

6. Is the arrow more likely to point to one section than another in this spinner? Explain your answer.

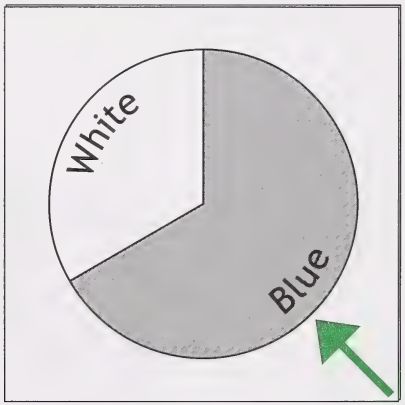
_____

_____

_____

When each section of the spinner is the same size, you are **equally likely** to land on any section.

7. Look at the spinner below. Which section do you think the arrow would be most likely to point to? _____



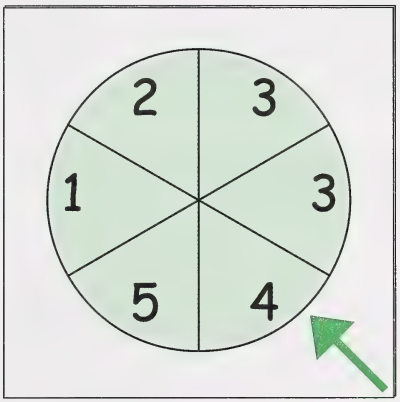
Explain your answer. _____

_____

Check your answers in the Appendix.

More Fractions

Look at the following spinner. There are six sections on it. The number 3 appears on two sections. The fraction $\frac{2}{6}$ can be used to show the probability of the arrow pointing to a 3.



8. What is the probability that the arrow will point to a 1?

_____

9. What is the probability of the arrow pointing to an odd number? (**Hint:** Count how many sections have odd numbers.)

_____

10. Is the arrow more likely to point to a 3 or a 4? Explain.

_____

_____

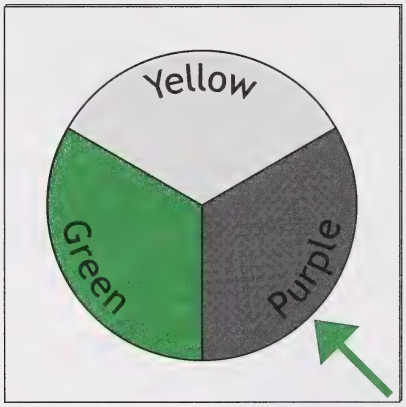
Check your answers in the Appendix.

Summing Up

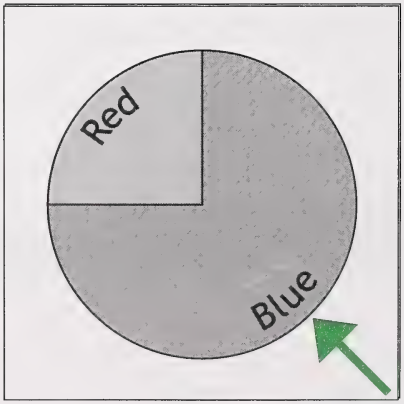
Fractions can be used to help you understand which outcomes are more or less likely.

If all the sections on a spinner are the same size, each outcome is equally likely. If some sections on the spinner are larger than others, the arrow is more likely to point to the larger section.

On the following spinner, it is equally likely that the arrow will point to any colour because each section is $\frac{1}{3}$ of the spinner.



On the following spinner, it is more likely that the arrow will point to blue because three of the four sections $\left(\frac{3}{4}\right)$ of the spinner are blue.



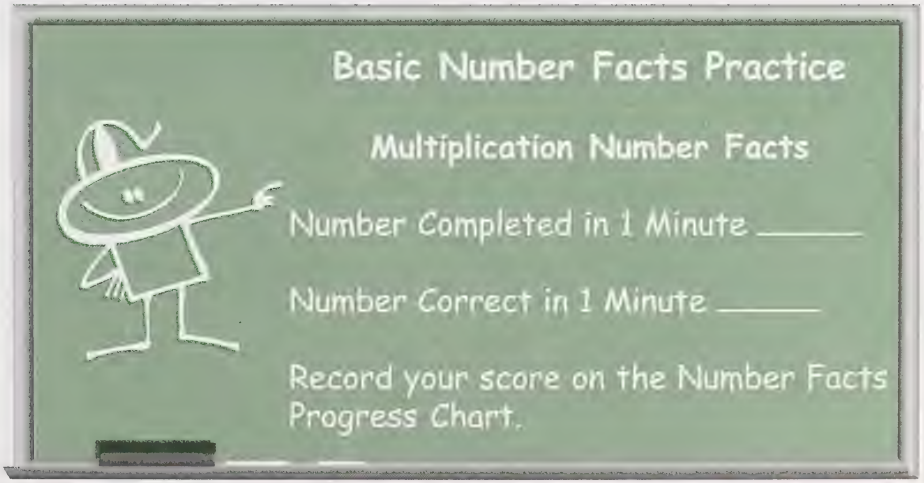
Check the following Internet sites for more probability activities:

- **http://shazam.econ.ubc.ca/flip/**
- **http://explorer.scrtec.org/explorer/explorer-db/browse/static/Mathematics/index.html**

  Select General Probability file. Try How to Make a Spinner, Race to a Quarter, or M and M Graphing and Probability.

Basic Number Facts Practice

Ask your home instructor to time you as you complete the following exercise. Your goal is to complete all 25 questions in 1 minute. At the end of 1 minute, count up how many questions you were able to complete. Write this number in the chart below. Then use the answer key in the Appendix to mark the exercise, and record your score in the space provided. Before you move on, go back and complete any questions you did not finish during the 1 minute. Mark these questions using the answer key as well.



11. Multiplication Number Facts
Timed Exercise: 1 minute

6 × 3	3 × 9	5 × 9	7 × 4	3 × 6
$7 \times 3 =$	$7 \times 7 =$	$8 \times 4 =$	$5 \times 4 =$	$5 \times 8 =$
5 × 5	6 × 7	7 × 5	9 × 4	4 × 7
$4 \times 9 =$	$8 \times 5 =$	$5 \times 6 =$	$8 \times 7 =$	$4 \times 4 =$
6 × 9	6 × 6	9 × 3	3 × 8	6 × 7

Check your answers in the Appendix.

Turn to Assignment Booklet 9A, and complete the activities for Day 3.

Games, Hidden Outcomes, and Probability

In the previous lessons, you discovered ways to predict the outcomes of numbered cubes and spinners. You were able to make predictions because you could look at the spinner or cube and decide which outcomes were likely.

Today you will do several activities where the outcomes are hidden.

You will need a small paper bag and several small squares of paper, or other objects, in a variety of colours. Instead of paper, you may use two colours of plastic bread clips, buttons, dried beans, beads, or small blocks. Be sure the items you choose are the same size and shape. Only the colours should be different.

Place seven items of one colour (A) and three items of another colour (B) in the bag.

Which colour are you most likely to pick? You can predict your chance of picking a certain colour by remembering what you learned in Day 3.

The probability of picking Colour A is 7 out of 10, or $\frac{7}{10}$. The probability of picking Colour B is 3 out of 10, or $\frac{3}{10}$.

1. Use this information to make a prediction about which colour you are more likely to pick.

Prediction: I am more likely to pick Colour _____

than Colour _____.

Test your prediction. Pick one item without looking in the bag. Record the colour of the item on the tally chart. Put the item back in the bag and shake it. Do this ten times.

Trial 1

Colour A	Colour B

Total: _____ / 10

Total: _____ / 10

2. Was your prediction correct? _____

Do another trial. Pick an item, record its colour in the tally chart below, and put it back in the bag. Shake the bag each time. Do this ten times.

Trial 2

Colour A	Colour B

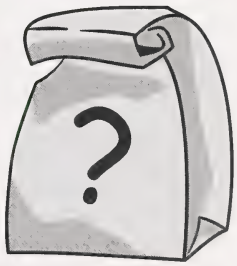
Total: _____ / 10

Total: _____ / 10

3. Was your prediction correct for this trial? _____

Check your answers in the Appendix.

Hidden Outcomes



Here is a bag that contains ten objects that are two different colours.

4. How could you estimate how many of each colour are in the bag?

_____

_____

Check your answers in the Appendix.

Note to the Home Instructor

Place ten identically shaped items of two different colours in the bag. **Do not** let the student see how many of each colour you use. The student will estimate how many of each colour there are in the bag by picking and recording the colours of the items.

Hidden Outcomes: Trial 1

For this trial, your home instructor will put ten items in the bag. The items will be two different colours. You will not know the exact numbers of each colour. Your job is to guess the number of each colour by picking ten items from the bag. Pick one item at a time from the bag. Replace each item before you pick another and shake the bag. Record your outcomes on the tally chart. Before you begin, write the two colours in at the top of the chart.

Colour A: _____	**Colour B:** _____

Total: _____ / 10

Total: _____ / 10

5. Based on your results, which of these estimates would you choose for the numbers of each colour in the bag? Put an ✗ beside your choice.

- nine Colour A and one Colour B _____
- eight Colour A and two Colour B _____
- seven Colour A and three Colour B _____
- six Colour A and four Colour B _____
- five Colour A and five Colour B _____

- four Colour A and six Colour B _____
- three Colour A and seven Colour B _____
- two Colour A and eight Colour B _____
- one Colour A and nine Colour B _____

Hidden Outcomes: Trial 2

Do another trial. Record your outcomes.

Colour A: _____	Colour B: _____

Total: _____ / 10

Total: _____ / 10

6. a. Which of the estimates in question 5 would you choose now?

_____

b. Explain your choice. _____

_____

7. Now, take the items out of the bag and count them. How close was your prediction?

_____

Check your answers in the Appendix.

The more trials that you do, the more accurate your prediction is likely to be.

Probability

Probability is a skill that is used by many people in their work. Scientists must conduct hundreds of trials and tests to prove their predictions about scientific discoveries. Weather forecasters also use probability to predict weather patterns.

Even sports announcers use probability when they make a prediction about which team will win a game. They look at the teams' previous wins and losses and make a guess about what will happen based on that information.

Games and Probability

Many games involve probability. Making predictions about the outcome can help you play these games.

8. Turn to page 251 of your textbook. Read about games of skill and luck. Then answer questions 1 and 2 at the bottom of page 251.

1. What game is based only on luck? Explain your answer.

_____

_____

2. What game requires some skill? Explain your answer.

_____

_____

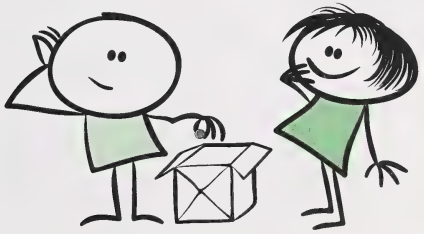
Check your answers in the Appendix.

Understanding probability can help you decide if a game is fair or not.

In a fair game all the players have an equal chance of winning.

Decide whether the following game is fair.

Tiger and Lucy place ten marbles in a box. **Two** marbles are blue and **eight** marbles are green. If a blue marble is drawn from the box, Tiger gets a point. If a green marble is drawn from the box, Lucie gets a point.



9. Is the game fair? _____ Why or why not? (**Hint:** Think about the probability of getting a blue marble or a green marble.)

_____

_____

_____

_____

Play Tiger and Lucie's game with your home instructor, a family member, or a friend. If you do not have marbles, use other small items of two colours.

10. To test whether the game is fair, do two trials to ten points.

What happens? _____

11. How could you make the game fair? _____

_____

Check your answers in the Appendix.

Just For Fun

To practise your skills and have some fun, try the following activity.

Turn to pages 248 and 249 of your textbook. You will need a partner for this game. You will also need two number cubes numbered 1 to 6.

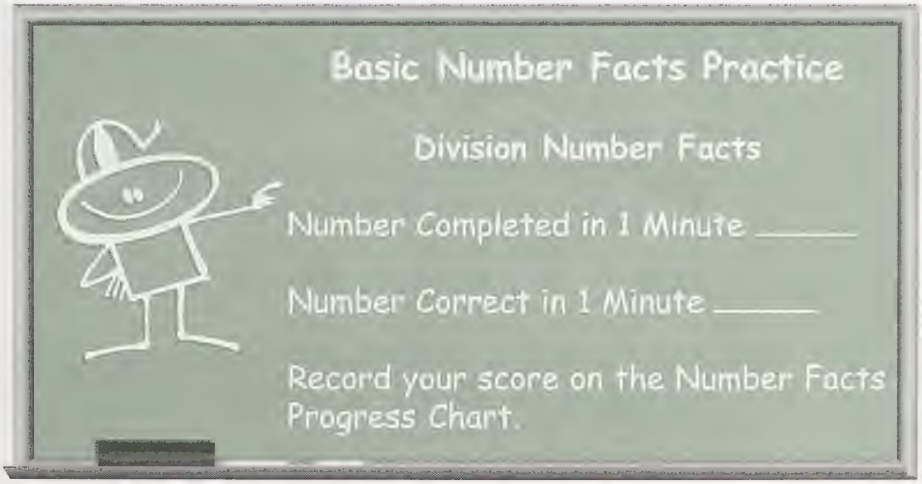
Go to Day 4 of the Cut-Out Learning Aids section of the Appendix and cut out the paper squares and the game grid.

Follow the directions on page 248 of your textbook to play the Racing Squares Game. When you finish, think about the numbers that seem to be rolled most often. Look at the area of the grid where most of the squares ended up. Is there a pattern?

Is this a game of luck, or is there a way to become more skilled at this game?

Basic Number Facts Practice

Ask your home instructor to time you as you complete the following exercise. Your goal is to complete all 25 questions in 1 minute. At the end of 1 minute, count up how many questions you were able to complete. Write this number in the chart below. Then use the answer key in the Appendix to mark the exercise, and record your score in the space provided. Before you move on, go back and complete any questions you did not finish during the 1 minute. Mark these questions using the answer key as well.



12. Division Number Facts
Timed Exercise: 1 minute

$3\overline{)15}$	$9\overline{)27}$	$8\overline{)32}$	$9\overline{)54}$	$3\overline{)18}$
$21 \div 7 =$	$45 \div 5 =$	$30 \div 6 =$	$24 \div 4 =$	$56 \div 7 =$
$5\overline{)25}$	$7\overline{)35}$	$8\overline{)40}$	$7\overline{)28}$	$5\overline{)20}$
$24 \div 8 =$	$49 \div 7 =$	$36 \div 4 =$	$63 \div 9 =$	$81 \div 9 =$
$6\overline{)48}$	$6\overline{)42}$	$8\overline{)64}$	$9\overline{)45}$	$6\overline{)36}$

Check your answers in the Appendix.

Turn to Assignment Booklet 9A, and complete the activities for Day 4.

Putting It All Together

Do you remember all the things you have learned about chance?

- Results of an event are called outcomes.
- Outcomes can be classed as certain or uncertain, possible or impossible, likely or unlikely.
- The chance of an outcome happening can sometimes be predicted.
- Some outcomes are equally likely.
- An outcome can be expressed in the form of a fraction.
- Predictions about outcomes can be tested and recorded.

People use probability to help them predict outcomes in many kinds of jobs. Probability can help you determine if a game involving luck is fair. Understanding what events are most likely to happen can help you make decisions.

Today you will show what you learned about probability and chance by completing several review questions. You will then work on a Challenge Activity related to the activities you have been working on in Section 1.

Part 1: Reviewing the Concepts

For Part 1 you will complete all of the review questions for Day 5 in Assignment Booklet 9A. First, you may wish to look back through the Student Module Booklet to review the concepts that have been covered in Section 1.

Part 2: Challenge Activities

The Challenge Activities in Part 2 are designed to extend and explore ideas about chance and probability. In Assignment Booklet 9A you will find two Challenge Activities. Choose **either** Activity A **or** Activity B (**or** you may do both if you wish).

Turn to Day 5 in Assignment Booklet 9A, and complete all of the review questions in Part 1. Then do one or both of the Challenge Activities in Part 2.

Assessing What You Know

Today is the last day you will be working on Section 1: Exploring Outcomes. You are to complete **three** activities in Assignment Booklet 9A:

- Showing What You Can Do
- Basic Number Facts
- Thinking About What You Know

Read the explanation of the activities for all three parts before turning to Assignment Booklet 9A. Note that you will need the help of your home instructor for Parts 1 and 2.

Part 1: Showing What You Can Do

For this activity you will need the help of your home instructor. You will be working on a short activity while your home instructor observes you. As you work through the problem, try to explain clearly what you are doing.

Your home instructor may ask you questions like the following:

- "How do you know that?"
- "Why did you decide to do that?"
- "How did you get that answer?"

Note to the Home Instructor

This performance assessment should take about 20 minutes. The Home Instructor's Assessment Page and accompanying Student's Assessment Page can be found in Day 6 of Assignment Booklet 9A. Remove both pages from the Assignment Booklet. Read over the student's page so you are familiar with the student's assigned task. You should also preview the interview questions and the checklist before the student begins working on the assigned task.

As the student works to answer the questions, encourage him or her to talk about what he or she is doing. **Allow the student to use any manipulatives or cut-out learning aids available to help solve the problem**. You may or may not wish to use some of the interview questions. Look for understanding and the student's ability to explain clearly what he or she is doing to arrive at an answer. Indicate on the checklist whether you feel the student demonstrated the skills being assessed.

Attach both assessment pages to Assignment Booklet 9A before sending it in for marking.

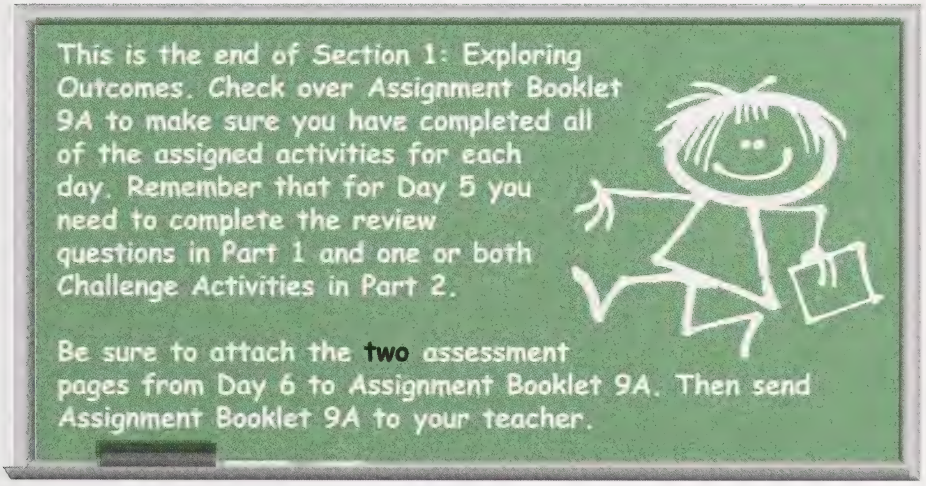
Part 2: Basic Number Facts

In this activity you will show how well you are learning the basic number facts for addition and subtraction. Ask your home instructor to time you as you do each test.

Part 3: Thinking About What You Know

Spend a few minutes looking back over Days 1 to 5 of the Student Module Booklet. Complete the statements about things that you liked, things you didn't understand, and things you would like to learn more about. Your teacher will find this information helpful in determining how well you understood the information in the module.

When your home instructor is ready, turn to Assignment Booklet 9A and complete the activities found in Parts 1, 2, and 3 of Day 6.



Section 2

A Review of Modules 1 to 8

Day 7

Note to the Home Instructor

Days 7 to 14 review important concepts from Modules 1 through 8. Not all of the concepts covered in each module will be reviewed, so your student may wish to study the Student Module Booklet for each module as well as the review lessons.

The review lessons may be completed in any order. Assignment Booklet 9B will be sent in after Days 7 to 14 have been completed. There are no Putting It All Together or Assessing What You Know activities for this section.

It is suggested that you have the manipulatives used in the original modules available for reference as the student works through the review lessons.

Module 1 Review—Data Management

Today you will review the ways in which information can be collected and shown to others. Refer to the Student Module Booklet for Module 1 if you need more help remembering the ideas.

Collecting Data

Data are facts and figures that can be organized to provide information. Collecting, organizing, and interpreting the data is called **data management.**

Business owners often gather information about their customers to help serve them better.

Before opening a new restaurant, it would be a good idea for the owner to find out what kind of food people in town enjoy. This information can be collected.

Data can be collected by doing a **survey**. A survey is made up of one or more questions asked of a sample of people to gather information.

The restaurant owner's survey would ask questions about what type of food people in town like best.

Restaurant Survey

Choose your favourite food from the list.

- ❍ Oriental Food
- ❍ Italian Pizza and Pasta
- ❍ Steak and Seafood
- ❍ Soup and Sandwiches
- ❍ Fast Food

A survey should ask questions that will give the necessary information. The questions should be simple and easy to understand.

1. Do you think the following question would be a good question for the restaurant owner's survey? Explain your answer.

   What is your favourite food?

   _____

   _____

   _____

Check your answer in the Appendix.

It probably is not possible to ask every person in town what their favourite food is. Instead, the owner may choose to ask a fraction of the people. If there are 2000 people in the town, perhaps 50 would be asked to fill out the survey.

A **sample population** may be chosen to give information about a larger group.

The sample population should include people

- of different ages
- with different ethnic origins
- with different interests and jobs
- from different areas

A random sample is made up of people who all have an equal chance of being selected.

2. Who would you ask in order to get a random sample of people for this restaurant survey?

_____

_____

_____

Check your answer in the Appendix.

Data can be recorded using a **tally sheet** or a **response sheet.**

If many different answers to the survey are expected, a response sheet should be used. A response sheet requires a word answer to be written.

What is your favourite food?	
Person	**Food**
Marianne	meatloaf
June	mashed potatoes
Marcos	pita bread
Abraham	tacos

To limit the number of possible answers, a **tally sheet** is often used. Tally marks are used to record the number of each response. Each | stands for one person's answer or response. Four strokes and a horizontal slash (𝍸) stands for five responses.

Type of Food	Tally	Total
Oriental Food	𝍸 |	
Italian	𝍸 III	
Steak and Seafood	𝍸 II	
Soup and Sandwiches	𝍸	
Fast Food	𝍸 II	

3. a. In the tally sheet, how many people chose fast food as their favourite?

_____

b. How many people chose soup and sandwiches? _____

c. How many people in all answered the survey question about their favourite food? _____

Check your answers in the Appendix.

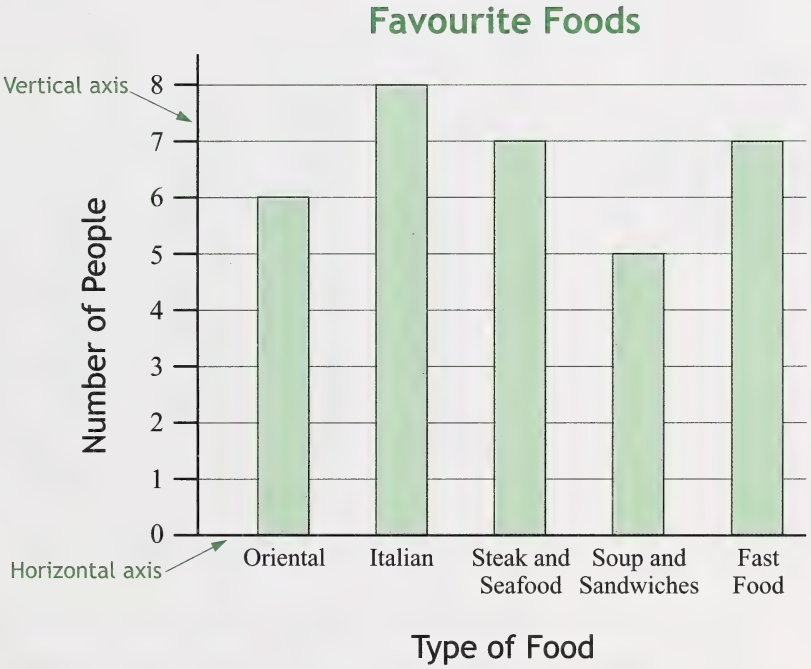
Displaying Data

A graph can be used to organize and display the information that is collected.

The data can be organized in a **bar graph**, on a **line plot**, or in a **pictograph**.

Bar Graphs

A bar graph presents information by using horizontal or vertical bars.

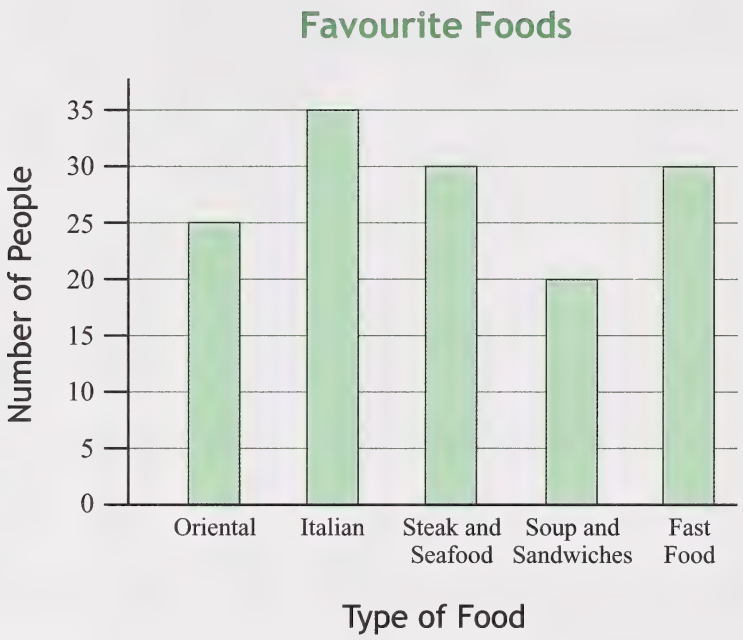


Notice the following things about the bar graph:

- The graph has a title.
- The **possible responses** are shown along the **horizontal axis**.
- The **number of responses** are shown on the **vertical axis**.
- Both the vertical and horizontal axes are labelled.
- The bars are vertical, evenly spaced, and coloured.
- The numbers on the vertical axis are equally spaced.

The previous graph uses **one-to-one correspondence**. Each number on the vertical axis stands for one person. The bar showing Oriental food reaches to the number 6. This means that six people like Oriental food best.

Sometimes it is necessary to show large numbers on a bar graph. When this happens, each interval along the vertical axis stands for a number that is greater than one.



Look at the vertical axis on the graph. Each interval represents five people rather than one person. This is called **many-to-one correspondence**.

Many-to-one correspondence is used on a bar graph to record large numbers of responses.

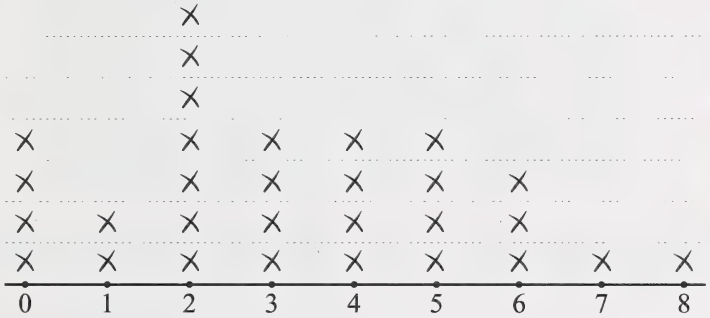
This graph shows that twenty-five people chose Oriental food.

Line Plots

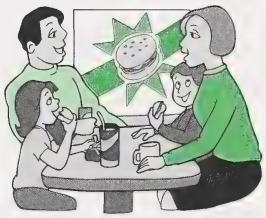
Another way to display information is to create a line plot. In a line plot, data is recorded using a number line with Xs or other marks above the numbers.

Suppose one of the questions asked on the survey was "How many times in the last month have you eaten in a restaurant?"

The results of this survey question could be shown on a line plot. Each X stands for a person who was surveyed.



Number of Restaurant Visits in the Last Month



4. How many people were surveyed in all? _____

5. How many people visited the restaurant three times in the last month?

_____

Check your answers in the Appendix.

Pictographs

In a pictograph, a symbol or picture is used to represent the data.

Perhaps the restaurant owner wants to know how many women, men, and children visit restaurants in town. The owner could go to a popular restaurant and count how many men, women, and children visit. The results of this count could be shown on a tally sheet.

	Tally	Total
Men	𝍸 𝍸 |	11
Women	𝍸 |||	8
Children	𝍸 |	6

Using this data, a pictograph can be constructed. Notice that each group of people is shown with a different symbol.

Restaurant Visitors	
Men	
Women	
Children	
Legend: = 1 man	= 1 woman = 1 child

Notice the following things about the pictograph:

- The pictograph has a title.
- A **legend** is included to tell what the symbols show.
- The symbols are evenly spaced and are similar in size.
- **One-to-one correspondence** is used.

A symbol can also be used to show more than one person. If there were a large number of visitors to the restaurant, **many-to-one correspondence** could be used.

Restaurant Visitors	
Men	
Women	
Children	
Legend: = 3 men = 3 women = 3 children	

6. In the pictograph above, one symbol represents three people. How many men visited the restaurant? _____

Check your answer in the Appendix.

Interpreting Data

Organizing data on a graph or chart helps you make **predictions** and **comparisons**.

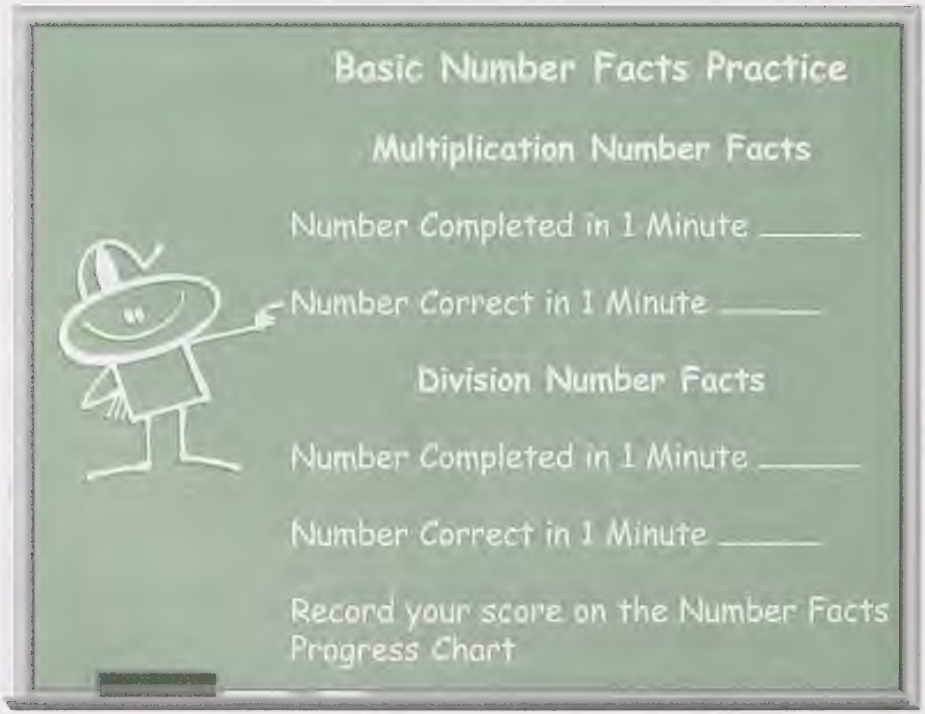
After interpreting the data in the bar graph called Favourite Foods, the restaurant owner may decide to open an Italian restaurant. He is **predicting** that an Italian restaurant will do well. His survey showed that people in town prefer Italian food over the other four choices.

After interpreting the data in the pictograph called Restaurant Visitors, the restaurant owner can make comparisons between the groups of people that eat in restaurants. Since more men than children come to a restaurant, perhaps he will offer a large adult menu. Maybe he will try to attract more children to the restaurant by offering special prizes, a large children's menu, or a play area.

Basic Number Facts Practice

Before you do your Assignment Booklet activity for today, practise some basic multiplication and division facts.

Ask your home instructor to time you as you complete the following exercises. Your goal is to complete all 25 questions in 1 minute. At the end of 1 minute, count up how many questions you were able to complete. Write this number in the chart below. Then use the answer key in the Appendix to mark the exercise, and record your score in the space provided. Before you move on, go back and complete any questions you did not finish during the 1 minute. Mark these questions using the answer key as well.



7. Multiplication Number Facts
Timed Exercise: 1 minute

3 × 7	6 × 9	8 × 7	5 × 9	7 × 2
$6 \times 8 =$	$9 \times 4 =$	$5 \times 5 =$	$8 \times 6 =$	$3 \times 8 =$
9 × 6	7 × 5	4 × 8	9 × 9	7 × 6
$6 \times 6 =$	$8 \times 9 =$	$8 \times 4 =$	$6 \times 7 =$	$9 \times 2 =$
7 × 4	5 × 4	8 × 8	5 × 3	6 × 4

Check your answers in the Appendix.

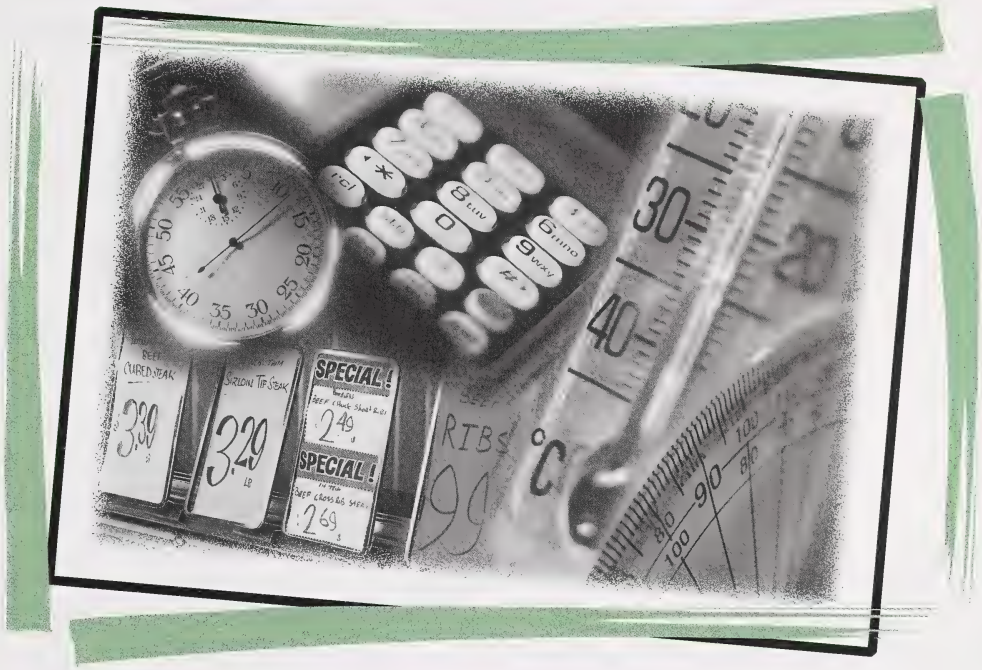
8. Division Number Facts
Timed Exercise: 1 minute

$8\overline{)64}$	$5\overline{)45}$	$9\overline{)36}$	$6\overline{)24}$	$6\overline{)54}$
$81 \div 9 =$	$32 \div 4 =$	$63 \div 7 =$	$35 \div 5 =$	$24 \div 3 =$
$7\overline{)21}$	$6\overline{)48}$	$9\overline{)45}$	$9\overline{)72}$	$4\overline{)36}$
$28 \div 4 =$	$40 \div 8 =$	$27 \div 9 =$	$42 \div 7 =$	$63 \div 9 =$
$8\overline{)72}$	$7\overline{)49}$	$4\overline{)24}$	$4\overline{)20}$	$6\overline{)30}$

Check your answers in the Appendix.

Turn to Assignment Booklet 9B, and complete the activities for Day 7.

Module 2 Review—Number Concepts and Patterns



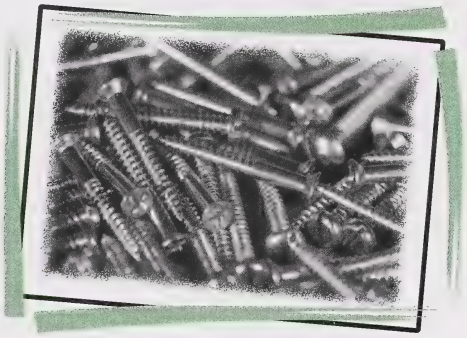
In Module 2 you learned that numbers are important in everyday life. It would be very difficult to live without using numbers.

Today's lesson will review estimating, writing, and rounding numbers. Number patterns will also be reviewed. If necessary, refer to the Module 2 Student Module Booklet.

You may use your base ten blocks and counters for today's activities.

Estimating

If you have to count a large number of objects quickly, it may be helpful to **estimate** how many objects are in the group. Estimating is also important when you are thinking about whether an answer to a math problem is reasonable or not.



A close guess or approximate answer is called an **estimate.**

Ask your home instructor to help you gather a set of small objects. Without counting them, place them on the desk in front of you. Think of a way to help you estimate.

1. Estimate the number of objects. _____

Explain your strategy for estimating. _____

_____

_____

2. Count the set of objects. How many are there? _____

How close was your estimate? _____

Check your answers in the Appendix.

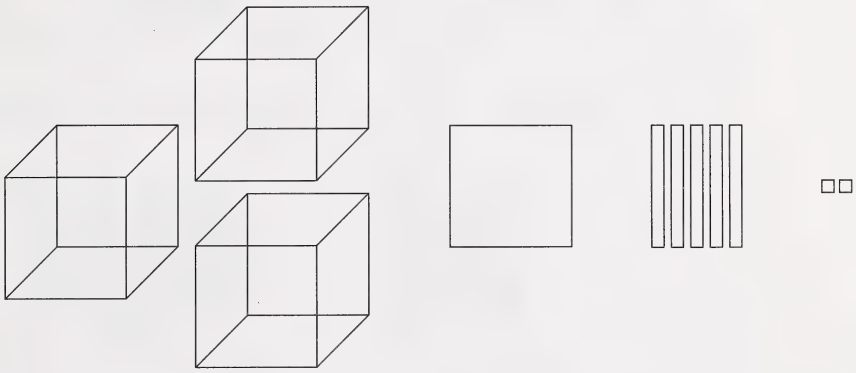
Place Value

A number can be shown in several different ways.

Example

Show the number 3152 in different ways.

- base ten drawing



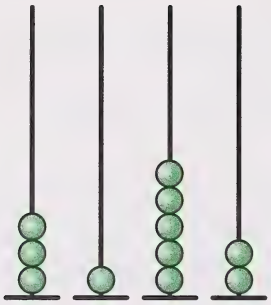
3 thousands **1** hundred **5** tens **2** ones

- in words: three thousand one hundred fifty-two
- in expanded form: $3000 + 100 + 50 + 2$
- on a place-value chart

TH	H	T	O
3	**1**	**5**	**2**

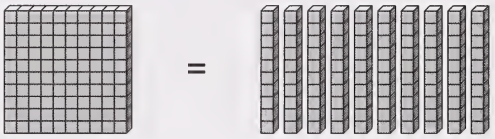
The **3** is in the **thousands** place and has a value of **3000**.
The **1** is in the **hundreds** place and has a value of **100**.
The **5** is in the **tens** place and has a value of **50**.
The **2** is in the **ones** place and has a value of **2**.

• in an abacus drawing



You can also show the number **3152** in other ways using the place-value chart.

You know that 100 is the same as 10 tens.



You also know that 1 hundred and 5 tens is the same as 15 tens.

By regrouping the 1 hundred and moving it to the tens column, 3152 can be shown like this.

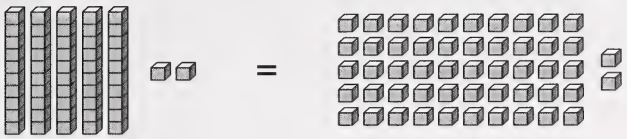
TH	H	T	O
3	0	15	2

Fifteen tens is the same as 1 hundred + 5 tens .

It can also be shown like this.

TH	H	T	O
3	1	0	52

← Fifty-two ones is the same as 5 tens + 2 ones .



5 tens + 2 ones = 52 ones

3. Show the number 6394 in each of the following ways.

a. in a base ten drawing (Use shortcut drawings.)

b. in words

_____

c. in expanded form

6394 = _____ + _____ + _____ + _____

d. in **two** different ways on a place-value chart

TH	H	T	O

e. in an abacus drawing

Check your answers in the Appendix.

Ordering Numbers

Knowing how to order numbers from least to greatest or greatest to least is very important.

Place value helps you understand how to put numbers in order.

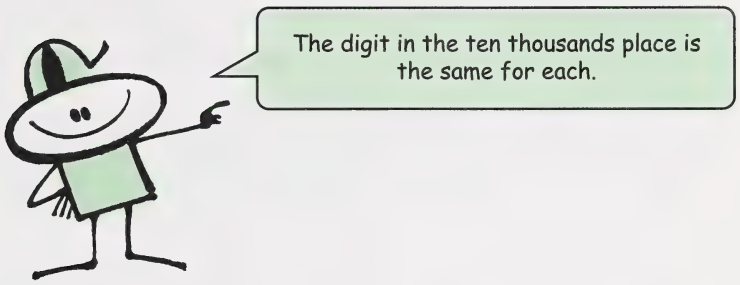
Example

Think about how you would put the following numbers in order from least to greatest.

26 589 26 859 28 596

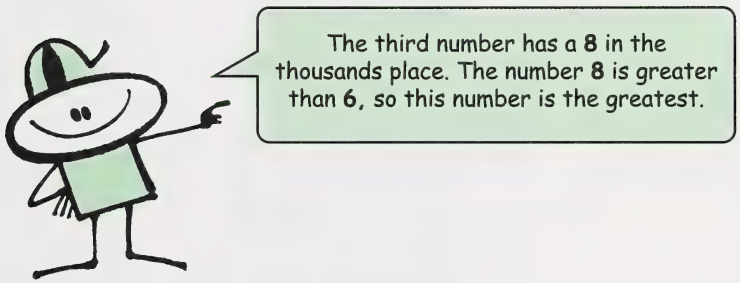
To decide which number is greatest, start at the left and move right. Look at the digit in the **ten thousands** place first.

26 589 **26 859** **28 596**



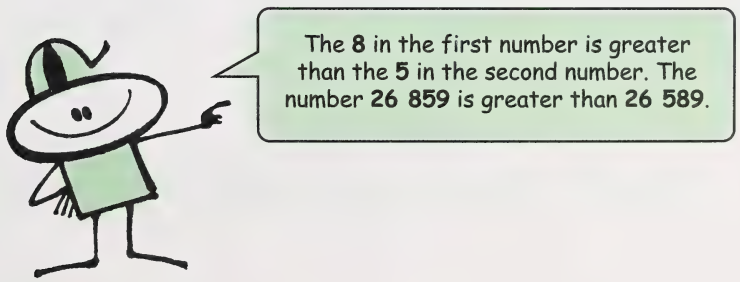
Since the numbers in the ten thousand place are the same, look at the digit in the **thousands** place.

26 589 **26 859** **28 596**



Now you know which number is the greatest. You now need to decide which of the remaining numbers is greatest. Look at the digits in the **hundreds** place.

26 859 **26 589**



The numbers in order from least to greatest are

26 589 26 859 28 596

Least Greatest

4. Use the boxed digits to answer the following questions.

1	3	5	2	4

a. Write the largest five-digit number that you can make using the digits in the boxes. _____

b. Write the smallest five-digit number that you can make.

_____

c. Write **four** more five-digit numbers in order from greatest to least.

_____
Greatest

_____

_____

_____
Least

5. What is the value of 6 in each of the following numbers?

a. 58 672 _____ **b.** 6338 _____

c. 10 961 _____

Check your answers in the Appendix.

Rounding Numbers

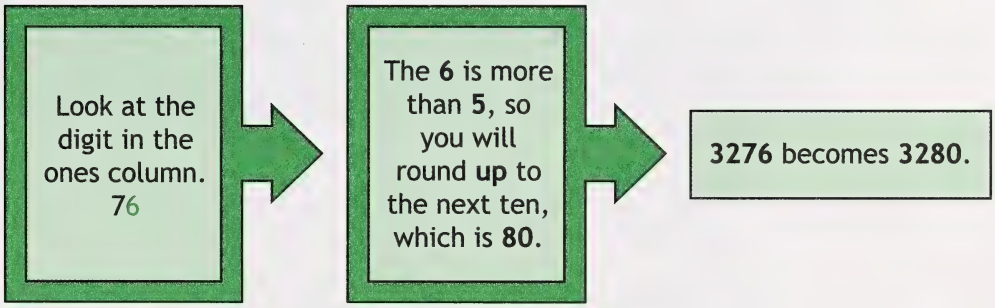
In Module 2 you practised **rounding** number to the nearest ten, hundred, or thousand. Rounding is useful for making difficult calculations easier to solve. It can help you estimate an answer and decide if the answer is reasonable.

If a number is less than **5**, you **round down** to the previous ten, hundred, or thousand. If a number is **5** or greater, you **round up** to the next ten, hundred, or thousand.

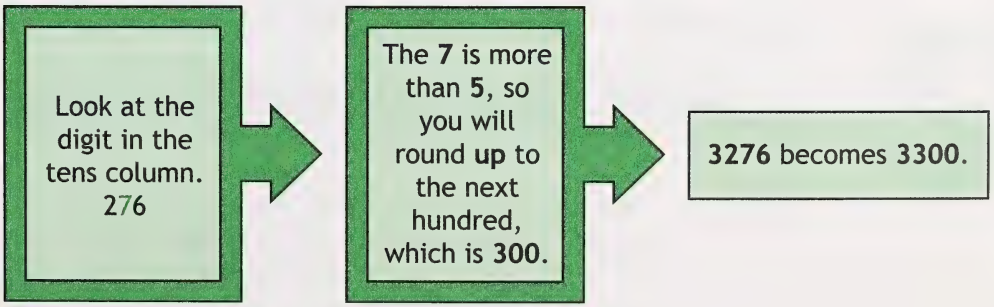
Rounded numbers will always end in one or more zeros.

Example

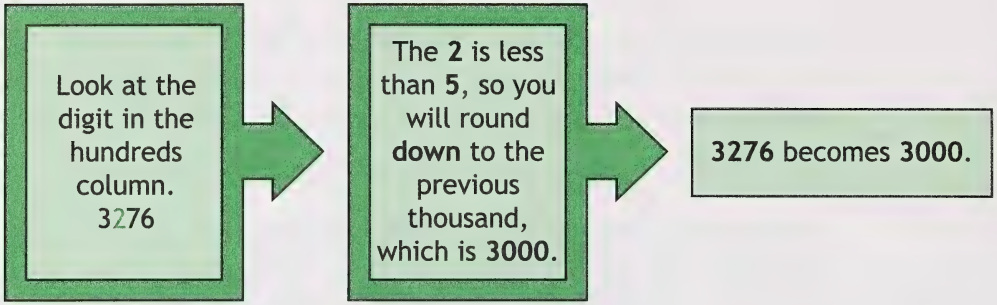
Round **3276** to the nearest ten.



Round **3276** to the nearest hundred.



Round **3276** to the nearest thousand.



When you round to the nearest **ten**, the number will end in **one zero.**

When you round to the nearest **hundred**, the number will end in **two zeros.**

When you round to the nearest **thousand**, the number will end in **three zeros.**

6. Round 3957 to the nearest ten. _____

7. Round 6439 to the nearest hundred. _____

8. Round 4204 to the nearest thousand. _____

Check your answers in the Appendix.

Patterns

Discovering and describing patterns is an important part of mathematics. Patterns are found in numbers and geometry.

Patterns **repeat** in some way and allow you to **predict** what will come next.

T-tables can be used to help you discover patterns with numbers.

The following T-table records the number of pizzas needed for a group of soccer players.

Players	Pizzas
2	3
4	6
6	9
8	12
10	
12	
14	

When you look at the numbers in the T-table, you can see some patterns:

- The number of players increases by 2 each time. If you **skip count** by 2, you can predict the numbers that will come next.

- The number of pizzas increases by 3 each time. If you **skip count** by 3, you can predict the numbers that will come next.

When you compare the number of players to pizzas, you can see another pattern.

2 players ⟶ 3 pizzas	2 players + **1** = 3 pizzas
4 players ⟶ 6 pizzas	4 players + **2** = 6 pizzas
6 players ⟶ 9 pizzas	6 players + **3** = 9 pizzas

9. a. Use the pattern to predict how many pizzas are needed for 8, 10, 12, and 14 players.

- 8 players + _____ = _____ pizzas
- 10 players + _____ = _____ pizzas
- 12 players + _____ = _____ pizzas
- 14 players + _____ = _____ pizzas

b. Explain the pattern rule.

_____

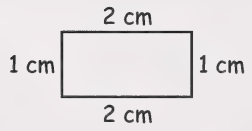
_____

_____

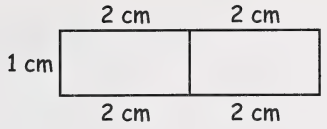
Check your answers in the Appendix.

T-tables can also help you solve **geometric** patterns.

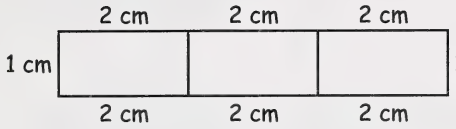
Use a T-table to record the perimeter of the rectangles arranged in a chain pattern.



$1 + 2 + 1 + 2 = 6$ cm

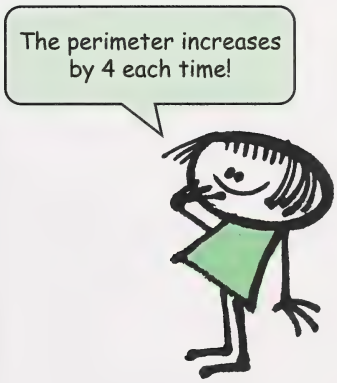


$1+2+2+1+2+2=10$ cm



$1+2+2+2+1+2+2+2=14$ cm

Rectangles	Perimeter
1	6
2	10
3	14
4	
5	
6	
7	



You will notice a pattern forming in the T-table. As the number of rectangles increases by 1, the perimeter increases by 4 cm.

10. What is the perimeter of seven rectangles when they are arranged in a chain? _____ cm

Check your answers in the Appendix.

Turn to Assignment Booklet 9B, and complete the activities for Day 8.

Module 3 Review—Fractions and Decimals

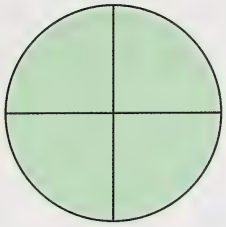
If you have ever shared a pizza or a pie with other people, you have eaten a **fraction** of the whole amount. If you have ever measured ingredients for baking a cake or cookies, you have used fractions. If you have worked with dollars and cents, you have used decimals.

Today's lesson is a review of the activities that you completed in Module 3. If you need to, refer to your Student Module Booklet for Module 3 as you work through this lesson.

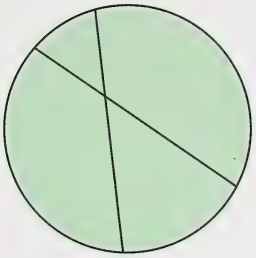
Fractions

Fractions are **equal parts** of a whole object or set.

When a set or an object is divided into fractions, each part must be equal in size.



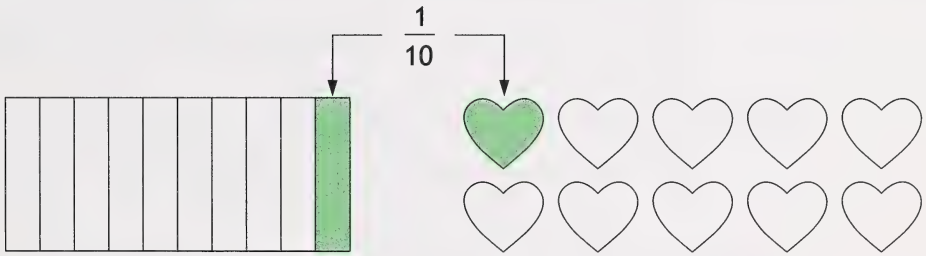
This circle is divided into fourths. Each part is an **equal** size.



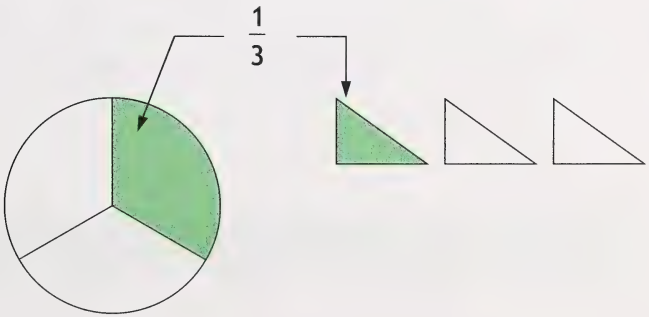
This circle is divided into four parts, but the parts are not of equal size. It does **not** show fourths.

The number of equal parts a set or object is divided into tells the name of the fraction.

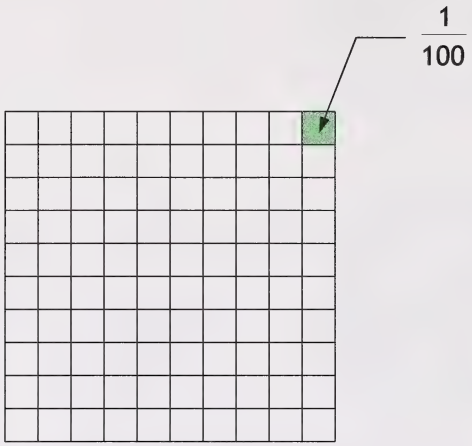
If a set or object is divided into **ten equal parts**, each part is called **one tenth**.



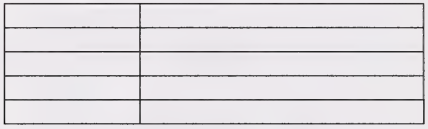
If a set or figure is divided into **three equal parts**, each part is called **one third**.

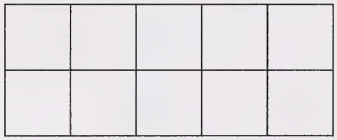


If a set or figure is divided into **100 equal parts**, each part is called **one hundredth**.

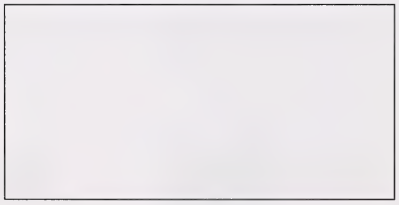


1. Which of the following figures show tenths? Circle your answer.





2. Divide this rectangle into thirds. Be sure that each part is the same size.



Check your answers in the Appendix.

Parts of a set or figure can be shaded to show a fraction. **Two fifths** of the following set is shaded.

3. Shade this set to show four fifths.

4. Shade this figure to show two thirds.

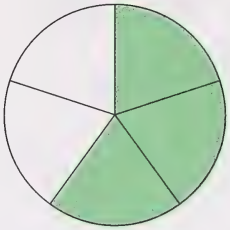
Check your answers in the Appendix.

Fractions can also be written with numerals.

When a fraction is written with numerals, it has two parts called the **numerator** and the **denominator.**

The denominator tells how many equal parts the object or set has been divided into. The numerator tells the portion or part of the whole.

In the following figure **three fifths** or $\frac{3}{5}$ of the circle is shaded. This means that the set or object has been divided into **five** equal parts and **three** of those parts are shaded.



5. Write each of the following fractions using numerals.

a. six tenths _____

b. two thirds _____

c. one sixth _____

Check your answers in the Appendix.

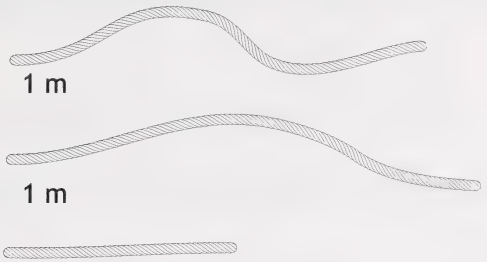
Decimal Numbers

Decimal numbers are another way to show parts of a whole.

A **decimal point** looks like a period. Numbers to the left of a decimal point are **whole numbers**. The numbers to the right of a decimal point show **tenths** and **hundredths**.

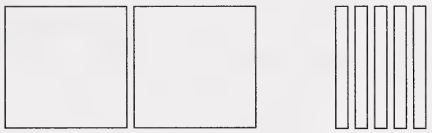
1.75

If you have **2.5** m of string, you have **two** whole metres and **five tenths** of another metre. The decimal point tells you that the 5 stands for 5 **tenths** of the whole.



0.5 m or five tenths of a metre

You can show 2.5 with base ten blocks.



You have 2 flats that stand for whole numbers. You have 5 rods that stand for tenths.

You can show decimal numbers on a place-value chart. The decimal numeral 2.5 can be shown like this.

Hundreds	Tens	Ones	Tenths
		2 .	5

The number 2.5 means 2 ones and 5 tenths.

6. a. Write 25.6 on the place-value chart.

Hundreds	Tens	Ones	Tenths

b. The number 25.6 means _____ tens, _____ ones, and _____ tenths.

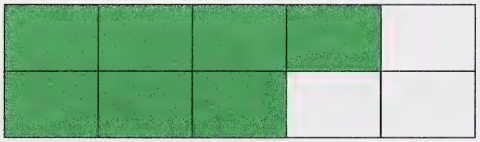
Check your answers in the Appendix.

When you see a zero to the left of the decimal point, it means that the number is less than one.

Example

The number **0.7** is the same as **seven tenths**.

It can be drawn like this.



0.7 of the figure is shaded.

Look at the decimal numbers in the following place-value charts.

This is read as seventy-six and two tenths.

Hundreds	Tens	Ones	Tenths
	7	6 .	2

This is read as eight tenths. (The zero is not read.)

Hundreds	Tens	Ones	Tenths
		0 .	8

7. What value does the 6 have in each number?

a. 532.6 _____

b. 2406.8 _____

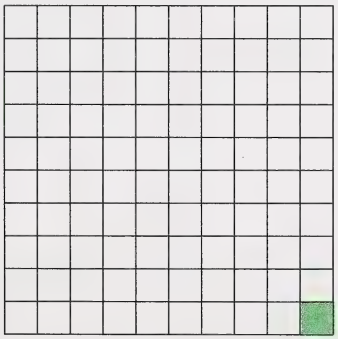
8. Write 639.5 in words.

_____

_____

Check your answers in the Appendix.

Hundredths can also be written as decimal numerals. The following grid has 100 squares.



One hundredth or 0.01 of this grid is shaded.

On a place-value chart, 0.01 would look like this.

Hundreds	Tens	Ones	Tenths	Hundredths
		0 .	0	1

The first zero stands for ones. The second zero stands for tenths. The 1 stands for hundredths.

Zero is a place holder and must always be included if the decimal number is less than one.

9. What is the value of the 4 in each of these decimal numbers?

a. 340.58 _____

b. 660.48 _____

c. 75.04 _____

Check your answers in the Appendix.

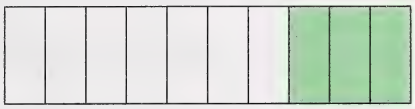
Decimal Numbers and Fractions Are Related

You know that decimal numbers include tenths and hundredths. To write a decimal number as a fraction, you would write the fraction in tenths or hundredths.

Example

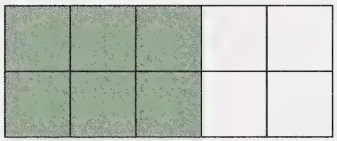
The number 0.3 is the same as $\frac{3}{10}$ or **three tenths**.

Drawings to show three tenths would look the same for both a fraction and a decimal number. Three parts are shaded to show $\frac{3}{10}$ or 0.3.



Five out of ten happy faces are shaded to show $\frac{5}{10}$ or 0.5.

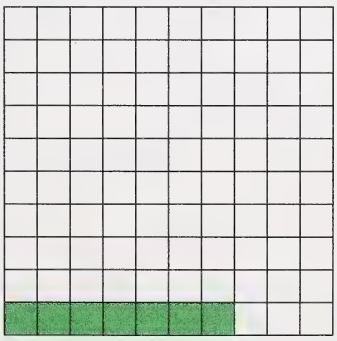
10. How much of the following grid is shaded? Write the answer as a fraction and as a decimal.



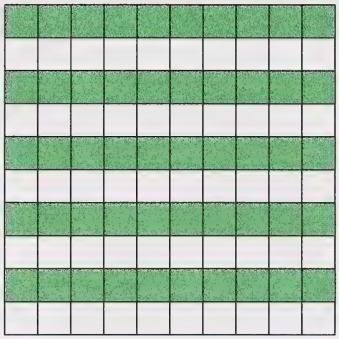
• Fraction: _____ • Decimal: _____

Check your answers in the Appendix.

The number **0.07** is the same as $\frac{7}{100}$ or **seven hundredths**. This can also be shown on a grid.



The following grid shows **0.50** or $\frac{50}{100}$ or **fifty hundredths**.



11. Write these fractions as decimal numbers.

a. $\frac{3}{10}$ _____

b. $\frac{35}{100}$ _____

c. $\frac{78}{100}$ _____

12. Write these decimal numbers as fractions.

a. 0.46 _____

b. 0.5 _____

c. 0.09 _____

d. 0.37 _____

13. Write these decimal numbers in words.

a. 0.62 _____

b. 0.99 _____

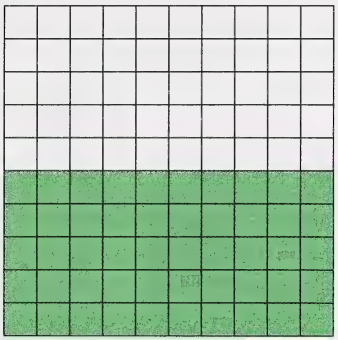
c. 0.08 _____

Check your answers in the Appendix.

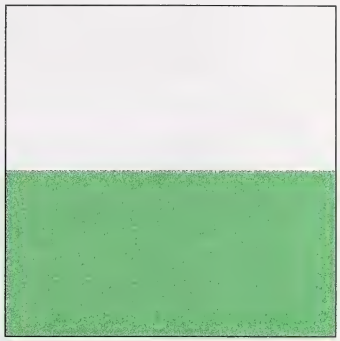
There are many ways to describe parts of a whole.

Example

You can see that the fraction $\frac{1}{2}$ is the same as 0.50 and $\frac{50}{100}$.

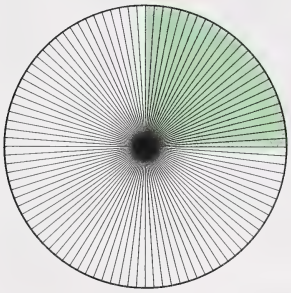


Fifty hundredths, 0.50, or $\frac{50}{100}$ are shaded

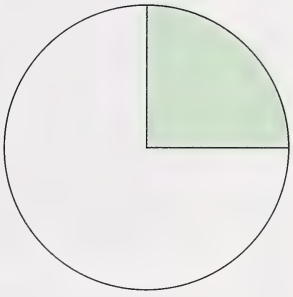


One half or $\frac{1}{2}$ is shaded.

The fraction $\frac{1}{4}$ is the same as 0.25 and $\frac{25}{100}$.

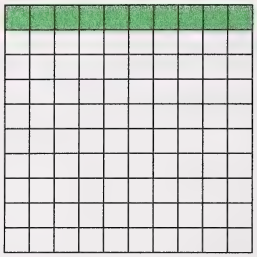


Twenty-five hundredths, 0.25, or $\frac{25}{100}$ are shaded.

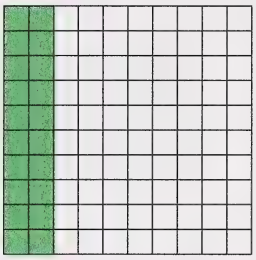


One quarter, or $\frac{1}{4}$, is shaded.

14. Write the fraction that is shaded in three different ways.

a. 

- _____
- _____
- _____

b. 

- _____
- _____
- _____

Check your answers in the Appendix.

Turn to Assignment Booklet 9B, and complete the activities for Day 9.

Module 4 Review—Addition and Subtraction

Today you will review the four mathematical operations and discuss some of the things you have learned about addition and subtraction.

Basic Operations

The four basic operations are **addition**, **subtraction**, **multiplication**, and **division**.

Addition questions ask you to find the total amount or **sum** of two or more numbers.

$$\begin{array}{r} 457 \\ +\ 349 \\ \hline \end{array} \quad \text{or} \quad 457 + 349 =$$

Subtraction questions ask you to find the **difference** between two numbers.

$$\begin{array}{r} 617 \\ -\ 469 \\ \hline \end{array} \quad \text{or} \quad 617 - 469 =$$

Multiplication questions ask you to find the **product** of two or more numbers. Multiplication is a quick way of finding a total amount when you are dealing with groups of items.

$$\begin{array}{r} 25 \\ \times\ 5 \\ \hline \end{array} \quad \text{or} \quad 25 \times 5 =$$

Division questions ask you to find the **quotient** of two numbers. When you divide, you are finding the number of groups or the number of items in each group.

$$5\overline{)125} \quad \text{or} \quad 125 \div 5 =$$

Addition and Subtraction

You can change the order of the numbers in addition without changing the sum. This is called the **order property of addition**.

6 + 3 is the same as 3 + 6.
6 + 3 = 3 + 6
9 = 9

This rule also works for problems with more than two addends.

6 + 3 + 8 is the same as 8 + 6 + 3.
(6+3) + 8 = (8+6) + 3
9 + 8 = 14 + 3
17 = 17

1. $7+9+5$ is the same as _____.

Check your answer in the Appendix.

Addition and subtraction facts are related.

Addition and subtraction facts can be thought of as families of facts. Related facts can be used to check a problem.

Example

Look at the following fact family.

$8+9=17$
$9+8=17$
$17-8=9$
$17-9=8$

Knowing the fact family can help you solve the problem $17 - \square = 9$.

You don't know what the missing number is, but you can rearrange the problem to make a related fact.

$17 - 9 = \square$

Now it is easier to solve.

$17 - 9 = 8$

2. Solve the following questions by using related facts. Write a related fact beside each problem.

a. $13 - \square = 5$ _____

b. $\square - 5 = 9$ _____

c. $3 + \square = 12$ _____

d. $\square + 9 = 15$ _____

Check your answers in the Appendix.

Regrouping may be necessary to find the sum or difference of numbers with two or more digits.

Example

Find the sum of $584 + 337 = \square$.

Begin by writing the numbers one above the other with the ones digits lined up.

$$\begin{array}{r} 584 \\ +\ 337 \\ \hline \end{array}$$

First, add the ones.

$4+7=11$

Eleven ones is the same as 1 ten and 1 one. Write the 1 at the bottom of the ones column and move the 1 ten to the tens column by writing it above the 8.

$$\begin{array}{r} {\scriptstyle 1} \\ 584 \\ +\ 337 \\ \hline 1 \end{array}$$

Now, add the numbers in the tens column.

$1+8+3=12$ 12 tens = 120

Regroup the tens by writing the 2 below in the tens column and carrying the 1 to the top of hundreds column.

$$\begin{array}{r} {\scriptstyle 1\,1} \\ 584 \\ +\ 337 \\ \hline 21 \end{array}$$

Finally, add the digits in the hundreds column.

$1+5+3=9$

Write the total at the bottom of the hundreds column. The sum is 921.

$$\begin{array}{r} {\scriptstyle 1\,1} \\ 584 \\ +\ 337 \\ \hline 921 \end{array}$$

3. Find each of the following sums.

a.
$$\begin{array}{r} 358 \\ +\ 63 \\ \hline \end{array}$$

b.
$$\begin{array}{r} 274 \\ +\ 178 \\ \hline \end{array}$$

c.
$$\begin{array}{r} 946 \\ +\ 244 \\ \hline \end{array}$$

Check your answers in the Appendix.

When finding the difference $742 - 257 =$, begin by writing the numbers one above the other with the ones digits lined up.

$$\begin{array}{r} 742 \\ -\ 257 \\ \hline \end{array}$$

You must use regrouping to subtract 7 ones from 2 ones. Borrow 10 ones from the tens column. To do this, change the 4 in the tens column to a 3 and add the 10 ones to the ones column (to give you 12 ones).

$$\begin{array}{r} {\scriptstyle 3\ 12} \\ 7\not{4}\not{2} \\ -\ 257 \\ \hline \end{array}$$

Now you can subtract 7 ones from 12 ones.

$12 - 7 = 5$

Write the 5 below.

$$\begin{array}{r} {\scriptstyle 3\ 12} \\ 7\not{4}\not{2} \\ -\ 257 \\ \hline 5 \end{array}$$

To subtract 5 tens from 3 tens, you need to regroup by borrowing 10 tens from the hundreds column. Change the 7 in the hundreds column to 6 and add the 10 tens to the tens column (to give you 13 tens). Then subtract 5 tens from 13 tens.

$13 - 5 = 8$

Write the 8 below.

$$\begin{array}{r} 6\ \mathbf{13}\ 12 \\ \cancel{7}\ \cancel{\mathbf{4}}\ \cancel{2} \\ -\ 2\ \mathbf{5}\ 7 \\ \hline \mathbf{8}\ 5 \end{array}$$

Finally, subtract the digits in the hundreds column.

$6 - 2 = 4$

Write the answer 4 below. The difference is 485.

$$\begin{array}{r} \mathbf{6}\ 13\ 12 \\ \cancel{7}\ \cancel{4}\ \cancel{2} \\ -\ \mathbf{2}\ 5\ 7 \\ \hline \mathbf{4}\ 8\ 5 \end{array}$$

4. Find the following differences.

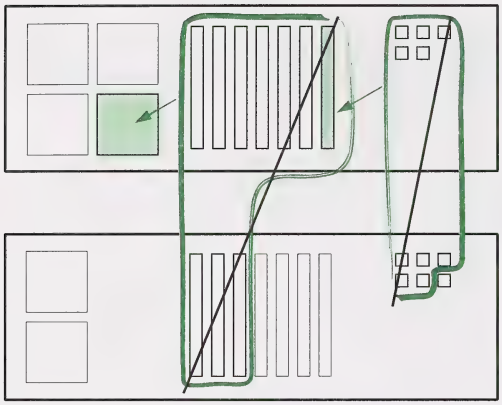
a. $\begin{array}{r} 805 \\ -\ 533 \\ \hline \end{array}$ **b.** $\begin{array}{r} 532 \\ -\ 162 \\ \hline \end{array}$ **c.** $\begin{array}{r} 684 \\ -\ 599 \\ \hline \end{array}$

Check your answers in the Appendix.

Base ten blocks can be used to show regrouping in addition and subtraction questions.

Example

$365 + 276 =$



To find the sum, start by adding the ones. There are 11 ones in all. Regroup them into 1 ten that can be moved to the tens.

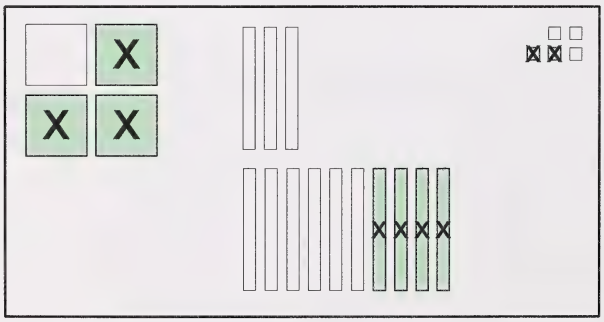
Then add the tens. Regroup 10 tens and move them to the hundreds.

You now have 6 hundreds, 4 tens, and 1 one.

$365 + 276 = 641$

Example

$435 - 242 =$



– 242

To find the difference, begin by drawing the larger number.

Start with the ones. Subtract 2 ones by drawing and X through each. This leaves 3 ones.

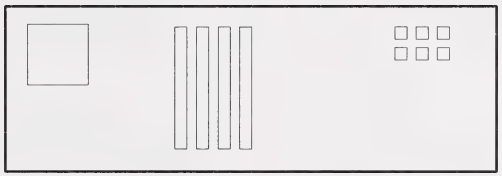
Next, look at the tens. You cannot subtract 4 tens from 3. Regroup 1 hundred for 10 tens. Put an X through the hundred. You now have 13 tens and can subtract 4 tens by putting an X through each. You are left with 9 tens.

Lastly, subtract 2 hundreds by putting an X through them. You are left with 1 hundred, 9 tens, and 3 ones.

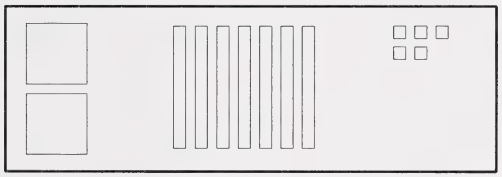
$435 - 242 = 193$

5. Show how to solve these questions by regrouping the base ten blocks in the diagram.

a.

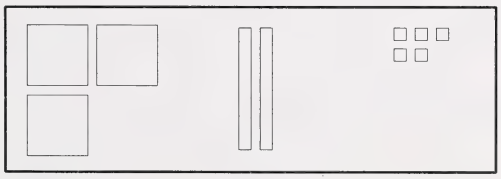


+



= _____

b.



= _____

– 232

Check your answers in the Appendix.

Estimation can be used to help find solutions to addition and subtraction problems.

Estimating is a quick way to check your answer to see if it makes sense. Rounding numbers to the nearest ten, hundred, or thousand helps you estimate sums and differences.

Example

$$\begin{array}{rcr} 216 & \longrightarrow & 200 \\ +\ 389 & \longrightarrow & +\ 400 \\ \hline & & 600 \end{array} \qquad \begin{array}{rcr} 8283 & \longrightarrow & 8000 \\ -\ 5767 & \longrightarrow & -\ 6000 \\ \hline & & 2000 \end{array}$$

Reverse operations can be used to check solutions to problems.

Addition is the reverse operation of subtraction. Subtraction is the reverse operation of addition.

The solutions to addition and subtraction problems can be checked by using the reverse operation.

Example

Solve $267 - 123 = \square$.

Calculate	**Check**
$\begin{array}{r} 267 \\ -\ 123 \\ \hline 144 \end{array}$	$\begin{array}{r} 144 \\ +\ 123 \\ \hline 267 \end{array}$

The solution is correct. The reverse operation (addition) was used to check the solution.

6. Check the solution to this problem by using the reverse operation.

$$\begin{array}{r} 486 \\ +\ 592 \\ \hline 1088 \end{array}$$

The solution is _____ (correct, incorrect).

Check your answers in the Appendix.

Decimal numbers are added and subtracted in the same way as whole numbers.

Example

$$\begin{array}{r} 1.3 \\ +\ 2.4 \\ \hline 3.7 \end{array} \qquad \begin{array}{r} 132.96 \\ -\ 20.44 \\ \hline 112.52 \end{array}$$

Sometimes **regrouping** is necessary when you are working with decimal numbers.

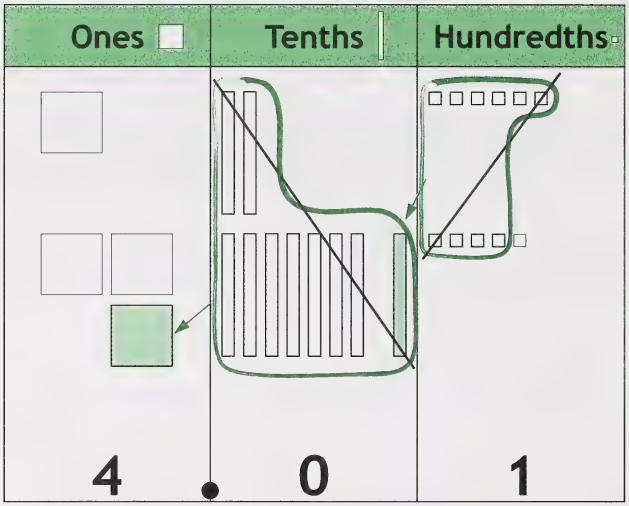
Example

$$\begin{array}{r} {\scriptstyle 1} \\ 1.5 \\ +\ 2.6 \\ \hline 4.1 \end{array} \qquad \begin{array}{r} {\scriptstyle 8\ 10} \\ 12\not{9}.\not{0}5 \\ -\ 16.12 \\ \hline 112.93 \end{array}$$

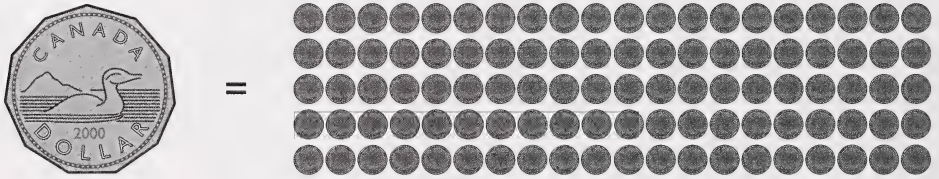
You can use base ten drawings to show regrouping when adding or subtracting decimal numbers.

Example

To show $1.26 + 2.75$, your drawing would be similar to this.



When you add or subtract money (dollars and cents), you use the decimal system.



$1 100¢

One cent is $\frac{1}{100}$ (or one hundredth) of a dollar because there are 100¢ in $1.

Eight cents can be written as the decimal number **$0.08**.

One dollar and 50 cents can be written as **$1.50**.

7. Use a dollar sign and a decimal to write the following money amount.

Thirty-eight dollars and fifty-nine cents _____

Check your answers in the Appendix.

Word problems can be solved by using different methods of calculation.

Problems may be solved by

- using **manipulatives**
- using **pencil and paper**
- using a **calculator**
- using **mental math**
- **estimating** the answer

These suggestions may help you decide the best method of solving a problem:

- Use **manipulatives** if you need to act out a problem or if it involves something that you need to see or actually do yourself.
- Use **pencil and paper** when an exact answer to a simple problem is needed and when you need to show your calculations.
- Use a **calculator** if there are several numbers to add, subtract, multiply, or divide.
- Use **mental math** when you can see shortcuts or if there are patterns in the numbers you are working with.
- Use **estimation** (and rounding) when an exact answer is **not** needed.

You will have a chance to choose the best method of calculation when you complete the Assignment Booklet exercises for today.

Turn to Assignment Booklet 9B, and complete the activities for Day 10.

Module 5 Review—Multiplication

In Module 5 you learned different ways of looking at multiplication problems. Today's lesson will review multiplication.

You will need some of the manipulatives from Module 5 for this lesson. Find your place-value mats, base ten blocks, and a calculator.

Multiplication and Addition

Multiplication and addition are **related** operations.

Imagine you have a photo album of your friends. Your album has 8 pages. There are 6 photos on each page. You have been asked how many photos you have in all.

There are different ways to find the answer to this problem.

- **Repeated addition:** Add 6 together eight times.

  $6+6+6+6+6+6+6+6=48$

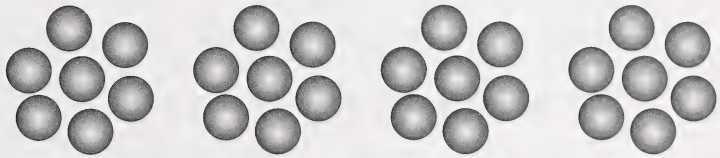
- **Multiplication:** Multiply 8 by 6.

  $8\times 6=48$

- **Skip counting** is like repeated addition. You can count by 6 eight times to get the answer.

  6, 12, 18, 24, 30, 36, 42, 48

1. Write one addition sentence and one multiplication sentence for this picture. Show your total in the sentence.



Addition sentence: _____

Multiplication sentence: _____

2. Draw a sketch to show the basic fact 3×9.

Check your answers in the Appendix.

Factors and Products

The **product** is the answer you get when you multiply two numbers (**factors**) together.

Factor × Factor = Product

3. Circle the **factors** in the following multiplication sentence.

$12 \times 5 = 60$

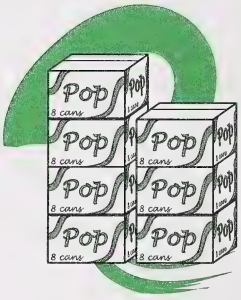
4. Circle the **product** in the following sentence.

$32 \times 2 = 64$

Check your answers in the Appendix.

The **order property** of multiplication states that the order of the factors does not change the product.

There are 7 boxes and each box holds 8 cans. How many cans are there in all?



The multiplication sentence is $7 \times 8 =$ ___ or $8 \times 7 =$ ___. The answer in both cases is 56 cans. The order of the factors does not make a difference to the answer.

5. Complete the following questions. Show that the order of factors does not matter.

Example: $3 \times 6 = 6 \times 3 = 18$

a. $6 \times 7 =$ _____

b. $8 \times 5 =$ _____

Check your answers in the Appendix.

An **array** is a group of objects arranged in rows and columns.

Arrays are helpful when multiplying numbers. The example below shows an array of stars.

There are 3 rows with 5 stars in each row.

$3 \times 5 = 15$ stars

If you look at the array by turning the page around, you will see an array of 5 rows with 3 stars in each row.

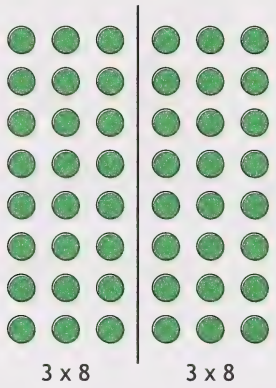
$5 \times 3 = 15$ stars

6. Draw an array for the basic fact $4 \times 6 =$ ___. Then complete the multiplication sentence.

$4 \times 6 =$ _____

Large arrays can be split into parts to help solve a multiplication problem.

Consider this array that shows the fact 6×8.



To make 6×8 easier to solve, split the array in two parts. Each smaller array is now equal to 3×8.

$$\begin{aligned} 6 \times 8 &= (3 \times 8) + (3 \times 8) \\ &= 24 + 24 \\ &= 48 \end{aligned}$$

This same 6×8 array can be split in other ways as well.

$$6 \times 8 = (1 \times 8) + (5 \times 8) = 8 + 40 = 48$$
$$6 \times 8 = (2 \times 8) + (4 \times 8) = 16 + 32 = 48$$

Factors can be grouped in different ways without changing the product. This is called the **grouping property** of multiplication.

Example

$$2 \times 3 \times 5 = 2 \times 3 \times 5$$

Put brackets around pairs of factors. Then solve.

$$(2 \times 3) \times 5 = 2 \times (3 \times 5)$$
$$6 \times 5 = 2 \times 15$$
$$30 = 30$$

The grouping does not make a difference to the product.

7. Use your calculator to solve this problem. Prove that the grouping of the factors does not make a difference to the product.

$$(30 \times 14) \times 7 = 30 \times (14 \times 7)$$
$$\_\_\_\_\_ \times 7 = 30 \times \_\_\_\_\_$$
$$\_\_\_\_\_ = \_\_\_\_\_$$

Check your answers in the Appendix.

Mental Math for Multiplication

Use the following multiplication strategies to help you multiply in your head.

Multiplying by Zero

Multiplying a number by zero always results in zero.

Example

7 groups of $0 = 0$ or $7 \times 0 = 0$

Multiplying by One

Multiplying a number by 1 results in the same number you started with.

Example

7 groups of $1 = 7$ or $7 \times 1 = 7$

8. Do the following questions in your head.

a. $13 \times 0 =$ _____ **b.** $9 \times 1 =$ _____

c. $0 \times 25 =$ _____ **d.** $1 \times 32 =$ _____

Check your answers in the Appendix.

Attaching Zeros

Multiply by 10, 100, or 1000 by attaching the correct number of zeros to the number you are multiplying.

If you multiply by 10, attach **one** zero to the number.

$24 \times 10 = 240$

If you multiply by 100, attach **two** zeros to the number.

$35 \times 100 = 3500$

If you multiply by 1000, attach **three** zeros to the number.

$6 \times 1000 = 6000$

9. Do the following questions in your head.

a. $63 \times 10 =$ _____

b. $96 \times 100 =$ _____

c. $1000 \times 8 =$ _____

Check your answers in the Appendix.

Rounding

Rounding numbers up or down can help you estimate answers to multiplication problems.

Rounding numbers to the nearest ten or hundred can help you estimate the answers for two- and three-digit multiplication questions.

Example

Solve $37 \times 3 =$ ☐ by estimating.

The number 37 is rounded up to 40.

$40 \times 3 = 120$

10. Estimate the following answers to the nearest ten.

a. $29 \times 3 =$ _____ **b.** $55 \times 5 =$ _____

c. $63 \times 2 =$ _____ **d.** $99 \times 6 =$ _____

11. Estimate the following answers to the nearest hundred.

a. $72 \times 10 =$ _____ **b.** $168 \times 10 =$ _____

c. $812 \times 10 =$ _____ **d.** $969 \times 10 =$ _____

Check your answers in the Appendix.

Multiplying Two-Digit Numbers

There are several ways to multiply a two-digit number by a one-digit number.

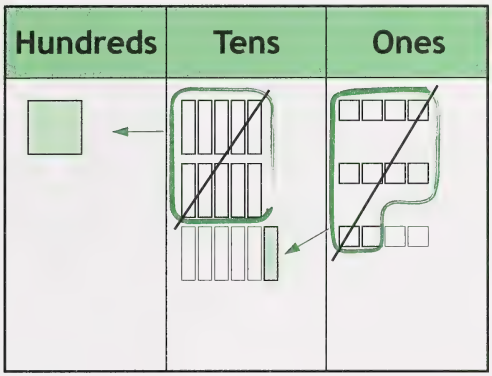
Base Ten Blocks

Use your place-value mat and base ten blocks to work through the following problem.

Show 54×3 on your mat. (Show three groups of 54.)

Hundreds	Tens	Ones
	▯▯▯▯ ▯▯▯▯ ▯▯▯▯	□□□□ □□□□ □□□□

Regroup the ones and then regroup the tens.



Regroup 10 tens to make 1 hundred. Six tens remain.

Regroup 10 ones to make 1 ten. Two ones remain.

Solution: $54 \times 3 = 162$

The Long Form of Multiplication

You can expand numbers to make it easier to multiply them.

Example

$$\begin{aligned} 36 \times 6 &= (30 + 6) \times 6 \\ &= (30 \times 6) + (6 \times 6) \\ &= 180 + 36 \\ &= 216 \end{aligned}$$

12. Multiply by expanding a number.

$$\begin{aligned} 27 \times 4 &= (\_\_\_\_\_ + \_\_\_\_\_) \times 4 \\ &= (\_\_\_\_\_ \times 4) + (\_\_\_\_\_ \times \_\_\_\_\_) \\ &= \_\_\_\_\_ + \_\_\_\_\_ \\ &= \_\_\_\_\_ \end{aligned}$$

Follow the steps in this example to review another way to solve a multiplication problem.

H	T	O	
	6	3	
		× 6	
	1	8	(6 × 3 = 18)
3	6	0	(6 × 60 = 360)
3	7	8	(Add 18 + 360 = 378)

Solution: $63 \times 6 = 378$

The Short Form of Multiplication

Follow these steps to review the short form of multiplication.

Step 1

H	T	O
	1	
	6	3
		× 6
		8

$3 \times 6 = 18$

Carry the 1 into the tens place.

Step 2

H	T	O
	1	
	6	3
		× 6
3	7	8

$6 \times 6 = 36$

Add the 1 that you carried over.

$36 + 1 = 37$

13. Solve these problems using the short form of multiplication.

a. $58 \times 6 =$ **b.** $29 \times 5 =$

Check your answers in the Appendix.

Multiplying Three-Digit Numbers

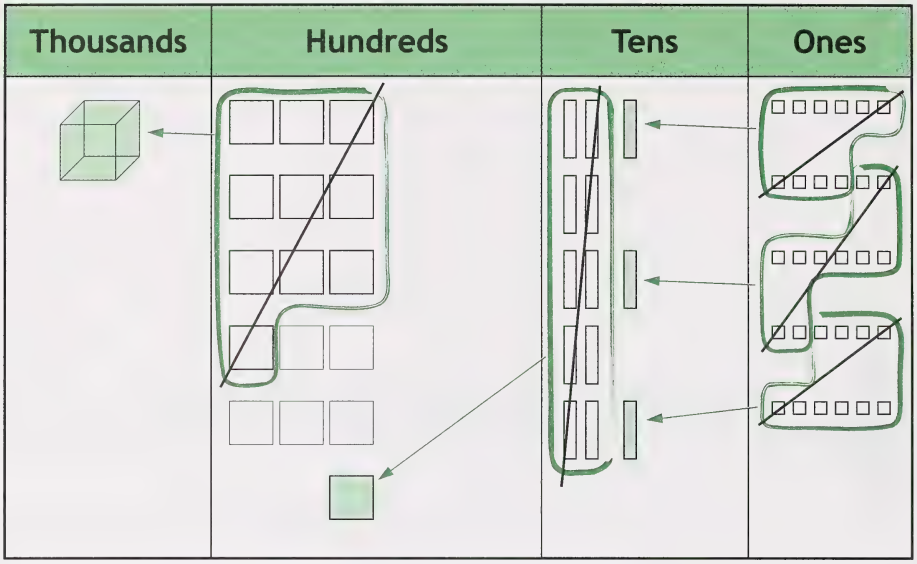
Three-digit numbers can be multiplied in the same way as two-digit numbers.

Base Ten Blocks

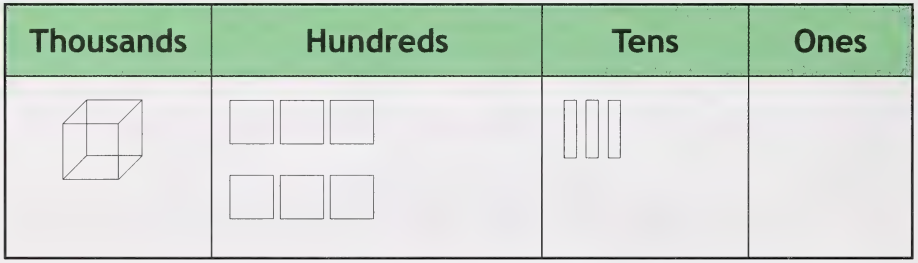
Multiply 326 by 5 using your place-value mat. Show five groups of 326.

Thousands	Hundreds	Tens	Ones
	□□□ □□□ □□□ □□□ □□□	▯▯ ▯▯ ▯▯ ▯▯ ▯▯	□□□□□□ □□□□□□ □□□□□□ □□□□□□ □□□□□□

Then regroup.



After regrouping, your mat should look like this.



Solution: $326 \times 5 = 1630$

The Long Form of Multiplication

Follow the steps in this example.

TH	H	T	O	
	3	2	6	
			× 5	
		3	0	$(5 \times 6 = 30)$
	1	0	0	$(5 \times 20 = 100)$
1	5	0	0	$(5 \times 300 = 1500)$
1	6	3	0	(Add $30 + 100 + 1500 = 1630$)

Solution: $326 \times 5 = 1630$

The Short Form of Multiplication

Follow the steps in this example.

You know that $5 \times 6 = 30$. Put the zero in the ones place and carry the 3 to the tens place.

TH	H	T	O
		3	
	3	2	6
			× 5
			0

You know that $5 \times 2 = 10$. Add on the 3 tens that were carried.

$10 + 3 = 13$

Put the 3 in the tens place and carry the 1 to the hundreds place.

TH	H	T	O
	1	3	
	3	2	6
			× 5
		3	0

Mulitply $5 \times 3 = 15$. Add on the 1 that was carried.

$15 + 1 = 16$

Put the numbers in the thousands and hundreds places.

TH	H	T	O
	1 3	3 2	6 × 5
1	6	3	0

14. Solve the following problems using the short method of multiplication.

a. $127 \times 5 =$ **b.** $298 \times 8 =$ **c.** $426 \times 7 =$

Check your answers in the Appendix.

Problem Solving

Multiplication strategies are often used in solving real-life math situations.

You were taught to use a four-step process for problem solving.

Step 1: Understand the problem.
Step 2: Make a plan. (Choose a strategy.)
Step 3: Try the plan.
Step 4: Look back.

Work through the following example that uses the four-step problem-solving process.

Example

Seven ticket sellers each sold 24 tickets. What was the total number of tickets sold?

Step 1: Understand the problem.

You know there are seven ticket sellers. Each seller sold 24 tickets. The question asks you to find the total number of tickets sold.

Step 2: Make a plan. (Choose a strategy.)

To find the total number of tickets sold, you could use multiplication. Multiplication is used when you are asked to find the total number of equal groups of items.

Step 3: Try the plan.

Calculate $7 \times 24 =$ or $24 \times 7 =$.

Use the long form of multiplication.

$$\begin{array}{r} 24 \\ \times\ 7 \\ \hline 28 \\ 140 \\ \hline 168 \end{array}$$

Altogether 168 tickets were sold by the ticket sellers.

Step 4: Look back.

Ask yourself if your answer is reasonable and if it answers the question asked in the problem.

15. Solve this problem using the four steps you have reviewed today. Do not use a calculator. Write your answer in a multiplication sentence and then in a word sentence.

Jana had to make party bags for her sister's birthday. She bought 9 packages of small toys to put in the bags. Each package held 24 toys. How many toys did Jana have in all?

Multiplication sentence: _____

Sentence answer: _____

_____

Check your answers in the Appendix.

Turn to Assignment Booklet 9B, and complete the activities for Day 11.

Module 6 Review—Division

Division is useful in your daily life. You use division when you make up packages of cookies for a bake sale, organize your dad's tools in the toolbox sections, or put photos in an album.

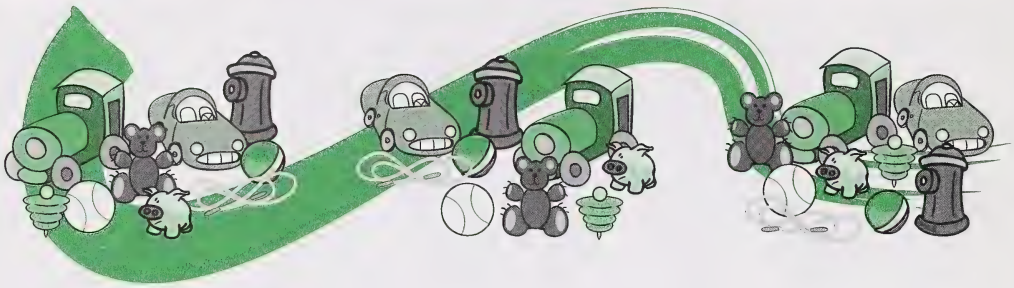
In this lesson you will review ways to divide using real objects, pencil and paper calculations, mental math strategies, and a calculator.

Gather the collection of small objects that you used as counters in Module 5. Use the counters as you work through the activities in today's lesson. You will also need a calculator.

Division is a way of sharing things equally.

Use your collection of counters to show how you would solve the following problem.

You have been asked to share 27 toys between 3 friends. If the toys are shared equally, how many toys will each friend get?



Each friend will get **nine** toys.

The division equation looks like this: $\mathbf{27 \div 3 = 9}$.

1. Use your counters to divide the groups. Write an equation and the answer for each question.

a. Divide \$30 between 5 people. _____

b. Divide 21 books into 3 boxes. _____

2. Write a division sentence for the following problem.

Joey's grandpa gave his collection of 56 coins to his 8 grandchildren. How many did each child receive if they each got the same number of coins?

_____

Check your answers in the Appendix.

Division is a way of grouping sets of objects into equal groups.

Use your counters to work out the answer to the following problem.

You have 36 pop cans to put into cartons. Each carton holds 6 cans. How many cartons will you need?

$36 \div 6 =$

You know the total number of items is 36. You must divide 36 items into groups of 6. A drawing of this problem would look like this.

You will need 6 cartons.

$36 \div 6 = 6$

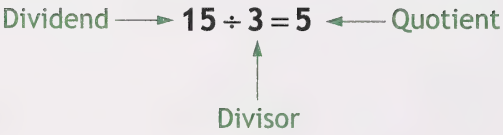
3. Divide 42 into groups of 7. Use your counters and then draw a picture to show how you solved this problem. Write a division sentence under the picture.

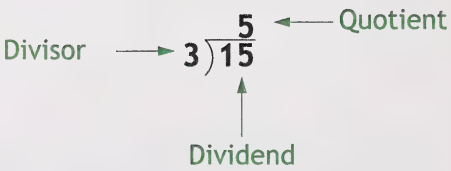
4. How many chocolates could you buy for 50¢ if each chocolate costs 5¢? Write a division sentence and then solve it.

Check your answers in the Appendix.

Quotients, Dividends, and Divisors

The answer in a division equation is called the **quotient**. The **dividend** is the total number in the group. The **divisor** tells how many groups the total is being divided into.





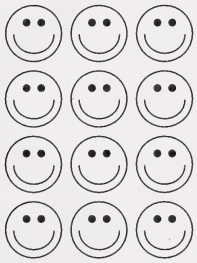
Multiplication and Division

Multiplication and division are **related**. They are reverse operations. Multiplication can be used to check division solutions.

Knowing multiplication facts helps you remember division facts.

Fact families can help you see how multiplication and division are related.

This array of rows and columns of happy faces can be described using four related sentences.



$4 \times 3 = 12$
$3 \times 4 = 12$

Multiplication sentences

$12 \div 3 = 4$
$12 \div 4 = 3$

Division sentences

These four sentences are **related** facts.

5. What fact is missing from the following set of related facts?

- $5 \times 6 = 30$
- $30 \div 6 = 5$
- $30 \div 5 = 6$
- _____

Check your answer in the Appendix.

The related multiplication facts can help you check your solution to a division question. You can work backwards to check the solution.

Example

Check to see if the answer to this division question is correct.

$18 \div 3 = 6$

Multiply the quotient and the divisor. You are working backwards through the equation.

$6 \times 3 = 18$

The answer is correct because the first number in the division equation (the dividend) is 18.

You learned that multiplication is repeated addition. **Skip counting** can help you remember multiplication facts. It can also help you remember division facts.

Division is like repeated subtraction. You can **skip count backwards** to help you remember the facts.

Place 28 counters on your desk.

Solve the problem $28 \div 4 =$ ___ by following these steps:

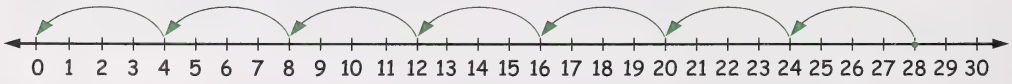
- Take away four counters.
- Take away four more counters.
- Continue taking away four counters at a time until you have none left.

How many groups of four counters did you take away?

You should have found that you took away seven groups of counters.

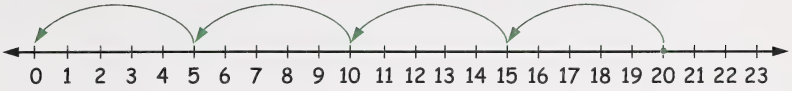
$28 \div 4 = 7$

A number line can be used to help skip count backwards.



From 28 you skip backwards seven times to get to zero.

6. Write the division sentence for this number line.



Division sentence: _____

Check your answer in the Appendix.

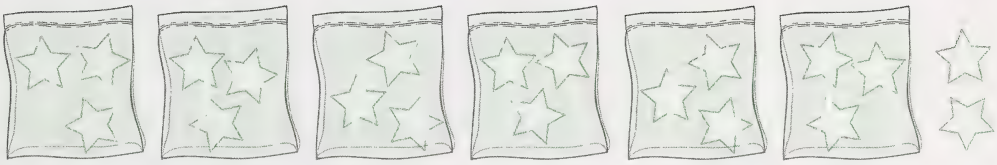
Remainders

Not all division problems work out evenly with the same number of objects in each group.

The **remainder** is the amount that is "left over" after the items are divided into equal groups.

Example

You have 20 stars and you want to make 6 packages of stars. How many stars will be in each package?



There are two stars left over after you put them into six packages. The remaining stars will not make a complete package.

The equation is written as follows:

$20 \div 6 = 3 \text{ R}2$

7. Solve the following problem by drawing a sketch. Include the remainder in your equation.

$13 \div 4 =$ _____ R _____

Check your answers in the Appendix.

Multiplication can be used to check the solutions to division questions with remainders.

$47 \div 9 = 5$ R2

Work backwards to check your answer.

$5 \times 9 =$ ▢

$5 \times 9 = 45$

Add the remainder.

$45 + 2 = 47$

Your answer is correct.

8. Is this answer correct? Show how you would prove it by checking with a related multiplication fact.

$51 \div 8 = 6 \text{ R}3$

Check your answers in the Appendix.

Estimating

An estimate is a close or reasonable guess.

Estimating the **closest** multiplication fact can help you solve division problems.

Example

Think about the problem $44 \div 7 =$ ▢.

What multiplication fact will give you an answer that is close to but less than 44?

The fact closest to 44 is $7 \times 6 = 42$.

The best estimate for the problem $44 \div 7$ is 6.

9. Make estimates for the following division questions.

a. $29 \div 7 =$ _____

b. $62 \div 6 =$ _____

c. $82 \div 9 =$ _____

Check your answers in the Appendix.

Mental Math for Division

There are several strategies that can help you do division problems in your head.

Dividing by One

When you divide a number by 1, you get the same number you started with.

Example

$18 \div 1 = 18$

10. Solve the following questions.

a. $40 \div 1 =$ _____

b. $72 \div 1 =$ _____

c. $984 \div 1 =$ _____

Check your answers in the Appendix.

Dividing a Number by Itself

When you divide a number by itself, the answer is always 1.

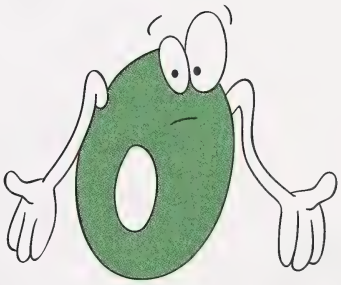
To quickly solve a problem like $26 \div 26 =$ ____, you can think, "What number $\times$ 26 equals 26?"

$1 \times 26 = 26$

You know that the answer is 1.

$26 \div 26 = 1$

Dividing Zero by a Number



When zero is divided by any number, the answer will always be zero.

$0 \div 5 = 0$ $0 \div 26 = 0$ $0 \div 357 = 0$

11. Solve these questions in your head using the rules you have just reviewed.

a. $35 \div 35 =$ _____

b. $0 \div 29 =$ _____

c. $299 \div 299 =$ _____

d. $0 \div 75 =$ _____

Check your answers in the Appendix.

Zapping Zeros

Numbers ending in zero can be divided easily by zapping zeros. Use this method when dividing by 10, 100, or 1000.

Example

$230 \div 10 =$ ▢

Each number ends in one zero, so cross off each zero. This results in $23 \div 1 =$ ▢. This is easy. $23 \div 1 = 23$, therefore $230 \div 10 = 23$ also.

Larger numbers work in the same way when divided by 100 or 1000. For instance, $3500 \div 100 = 35$ (drop two zeros) and $51\,000 \div 1000 = 51$ (drop three zeros).

12. Solve the following questions quickly in your head.

a. $650 \div 10 =$ _____ **b.** $8300 \div 100 =$ _____

Check your answers in the Appendix.

A multiple of 10 can be divided by zapping the zero, recalling the related multiplication fact, and then replacing the zero.

Example

$240 \div 8 =$ ▢

Drop a zero. You get $24 \div 8 =$ ▢.

Recall a fact. You know that $24 \div 8 = 3$.

Replace the zero. The answer is $240 \div 8 = 30$.

13. Solve these questions in your head by using the zero drop method. Cross out the zeros and then put them back in the answer.

a. $180 \div 6 =$ _____ **b.** $3600 \div 9 =$ _____

Check your answers in the Appendix.

An equal number of zeros can be dropped from the dividend and divisor when they both end in zeros.

In this example, both the dividend and the divisor end in a zero.

Example

$320 \div 80 =$ ▢

Drop the zeros and you have a basic fact.

$32 \div 8 = 4$

So, you know that $320 \div 80 = 4$.

Dividing Two-Digit Numbers

When you use pencil and paper calculations to solve division problems, follow these steps:

- Estimate.
- Multiply.
- Subtract.

Example

$28 \div 5 =$ ▢

Estimate the closest fact. You know that $5 \times 5 = 25$, so start by writing 5 above the 8. Then write 25 below 28.

$$\begin{array}{r} \mathbf{5} \\ 5\overline{)28} \\ \mathbf{25} \end{array}$$

Now subtract.

$$\begin{array}{r} 5 \\ 5\overline{)28} \\ \mathbf{-\ 25} \\ \hline \mathbf{3} \end{array}$$ ← Remainder

$28 \div 5 = 5$ R3

14. $59 \div 6 =$

Estimate the closest fact. _____

Use the fact to solve.

$6\overline{)59}$

$59 \div 6 =$ _____ R _____

Check your answers in the Appendix.

For other division problems, you may need to use a slightly different method.

Example

Solve this problem.

$85 \div 5 =$

First estimate how many 5s are in 8. Put the 1 over the 8 and multiply $1 \times 5 = 5$. Write the 5 below the 8 and subtract.

$$\begin{array}{r} \mathbf{1} \\ 5\overline{)85} \\ \mathbf{-\ 5} \\ \hline \mathbf{3} \end{array}$$

Now bring down the 5 and write it beside the 3.

$$\begin{array}{r} 1 \\ 5\overline{)85} \\ -\ 5 \\ \hline 35 \end{array}$$

Estimate how many 5s are in 35. You know that $7 \times 5 = 35$, so write 7 above the 5 and write 35 below 35. Subtract.

$$\begin{array}{r} 17 \\ 5\overline{)85} \\ -\ 5 \\ \hline 35 \\ \mathbf{-\ 35} \\ \hline \mathbf{0} \end{array}$$

The solutions is $85 \div 5 = 17$.

15. Solve $92 \div 6 =$ ____.

Check your answers in the Appendix.

Using a Calculator

A calculator can be helpful when checking your answers to difficult problems.

Example

$95 \div 5 = 19 \text{ R}2$

Check this answer by working backwards.

$19 \times 5 = 95$

$95 + 2 = 97$

Since 97 does not equal 95, you know that your answer is incorrect. The correct answer is $95 \div 5 = 19$ with no remainder.

Calculators are not always helpful when dealing with division because remainders are shown as decimal numbers. The remainder may not look anything like your answer.

Turn to Assignment Booklet 9B, and complete the activities for Day 12.

Module 7 Review—Measurement

It is important to have a good understanding of measurement. When you tell the time, count money, weigh yourself, or measure amounts for a recipe, you are using measurement skills.

This lesson will review the ideas that were discussed in Module 7. If you do not understand any of the activities in today's lesson, refer back to the Module 7 Student Module Booklet.

You will need a centimetre ruler to complete some activities in today's lesson.

Length, Height, Width, and Distance

The units used to measure height, width, length, and distance are

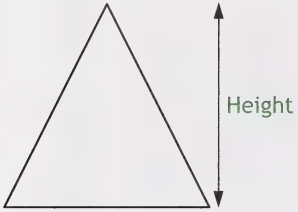
- **millimetre**
- **centimetre**
- **decimetre**
- **metre**
- **kilometre**

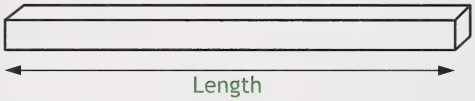
Smallest unit

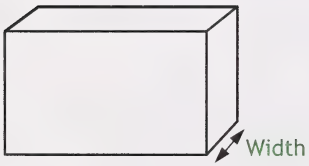
↓

Largest unit

Small units, such as millimetres or centimetres, are used to measure small things. Larger units, like metres, are used to measure larger things. A kilometre is used to measure long distances.







Distance between A and B

1. Name an object in your house that you would measure by height.

_____

2. Name something you would measure by distance.

_____

Check your answers in the Appendix.

3. Use a centimetre ruler to measure the following line.

_____

The line is _____ centimetres long.

Check your answers in the Appendix.

The units of measurement can be written in short form.

Unit	Short Form
millimetre	mm
centimetre	cm
decimetre	dm
metre	m
kilometre	km

4. Write the following measurements using the short form.

a. 28 metres = _____

b. 95 millimetres = _____

Check your answers in the Appendix.

Measurements can be written in several different ways.

If you look along the edge of your centimetre ruler, you will notice that there are small marks between every centimetre mark. These tiny units are called millimetres.

1 cm = 10 mm

You should also remember the following units.

1 dm = 10 cm
1 m = 10 dm
1 m = 100 cm
1 km = 1000 m

This information can be used to calculate measurements in different ways. For example, 3 cm is the same as 30 mm.

The following line can be measured using centimetres or millimetres. It measures 11 cm. It also measures 110 mm.

---

5. Name these measurements in a different way.

a. 4 cm = _____ mm

b. 80 mm = _____ cm

Check your answers in the Appendix.

6. Use your centimetre ruler to measure this line in centimetres and millimetres.

_____ cm _____ mm

Check your answers in the Appendix.

7. What unit would you use to measure each of the following items?

   a. the thickness of a penny _____

   b. the length of your math textbook _____

   c. the distance to the nearest town _____

Check your answers in the Appendix.

Estimation

Estimation is a useful skill for measurement activities. Estimating helps you decide what unit to use to measure an item.

Thinking about the size of an object can help you estimate units of measurement:

- a millimetre is about the thickness of a dime
- a centimetre is about the width of your index finger
- a decimetre is about the width of your hand
- a metre is about the distance between your outstretched hands (your arm span)

8. Estimate each measurement in centimetres and then use your ruler to measure.

a. How long is your pencil?

Estimate: _____ Measurement: _____

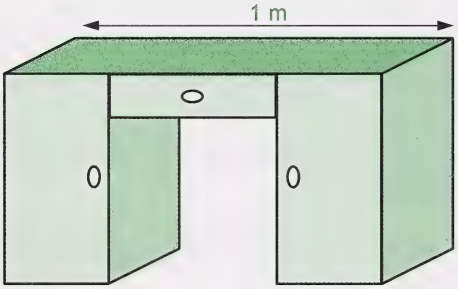
b. How thick is your eraser?

Estimate: _____ Measurement: _____

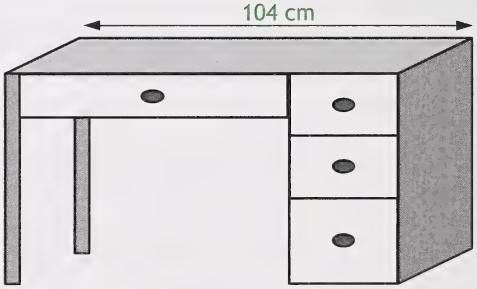
Check your answers in the Appendix.

Comparing Length

When two different units are used, one may be changed to help you compare length.



The width of this desk is 1 m.



The width of this desk is 104 cm.

To find out which desk is longer, change the metres into centimetres. You know that 1 m equals 100 cm, so the desk on the right is longer because it is 104 cm.

When units of measurement are changed, whole numbers are changed to decimal numbers or decimal numbers are changed to whole numbers.

Example

Change 58 mm into centimetres.

You know that 10 mm = 1 cm.

50 mm = 5 cm

Then **58 mm = 5.8** cm (5 cm and 8 mm)

Decimal numbers may also be changed into whole numbers when you are using measurements.

Example

Change 8.3 cm into millimetres.

You know that 1 cm = 10 mm.

8 cm = 80 mm

8.3 cm = 83 mm

9. Change these measurements from whole numbers to decimal numbers.

a. 38 mm = _____ cm **b.** 933 cm = _____ m

10. Change these measurements from decimal numbers to whole numbers.

a. 7.4 m = _____ cm **b.** 6.1 cm = _____ mm

Check your answers in the Appendix.

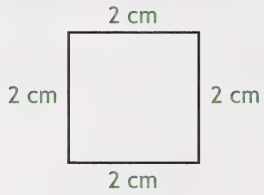
Perimeter

The **perimeter** is the distance around the outside of a figure.

To calculate the perimeter of a square or rectangle, add the lengths of the sides.

Example

The perimeter of this square is 8 cm.



$2 + 2 + 2 + 2 = 8 \text{ cm}$

or

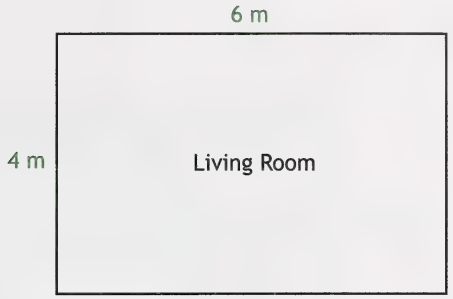
$2 \text{ cm} \times 4 \text{ sides} = 8 \text{ cm}$

Example

The perimeter of this rectangle is the total of the lengths of all its sides.

$18 + 18 + 45 + 45 = 126 \text{ mm}$

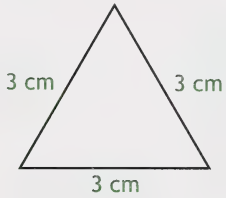
11. Calculate the amount of baseboard needed in the living room if it is a rectangular shape with two sides that are 6 m long and two sides that are 4 m long.



The amount of baseboard need is _____ m.

Check your answers in the Appendix.

The perimeter of other polygons can also be calculated by adding the lengths of the sides.



Perimeter = 3 cm + 3 cm + 3 cm = **9 cm**

The distance around the outside of a circle or other curved object is called the **circumference.**

It is difficult to measure the circumference of a curved object using a ruler. A tape measure or a string works better.

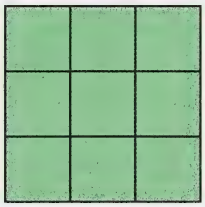
Area

Area is calculated in **square units.**

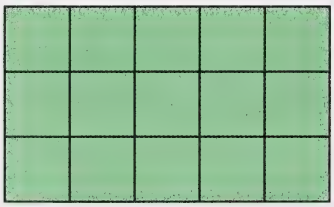
Square units can be written with short forms.

Unit	Short Form
square millimetres	mm^2
square centimetres	cm^2
square decimetres	dm^2
square metres	m^2
square kilometres	km^2

The area of the following square can be calculated by multiplying the length of the two sides. The square is 3 cm by 3 cm. You know that $3 \times 3 = 9$, so the area is 9 cm^2.



The area of a rectangle is calculated the same way. This rectangle measures 5 cm by 3 cm.



Multiply 5×3. The product is 15. The area is 15 cm^2. You can check your answer by counting the shaded squares.

12. Calculate the area of a bedroom if the room measures 3 m by 6 m.

Check your answer in the Appendix.

Capacity

Capacity measures the amount a container will hold.

Litres and **millilitres** are used to measure capacity. Liquids, canned foods, and paint are measured in litres and millilitres.

1 L = 1000 mL

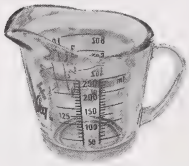
13. On the following chart, write the names of two more items that hold more than 1 L and two more items that hold less than 1 L.

More than 1 L	Less than 1 L
car gas tank	teacup
bathtub	pop can

Check your answers in the Appendix.

It is sometimes necessary to change millilitres to litres or litres to millilitres.

A typical measuring cup holds 250 mL.



Two measuring cups will hold $250 + 250 = 500$ mL.
Three cups will hold $250 + 250 + 250 = 750$ mL.
Four cups will hold $250 + 250 + 250 + 250 = 1000$ mL $= 1$ L.

14. How many 250-mL cups of liquid would fill a 2-L container?

_____

15. a. In 3 L there are _____ mL.

b. In 4.6 L there are _____ mL.

c. In 4000 mL there are _____ L.

d. In 5200 mL there are _____ L.

Check your answers in the Appendix.

Mass

Mass is the amount an object weighs.

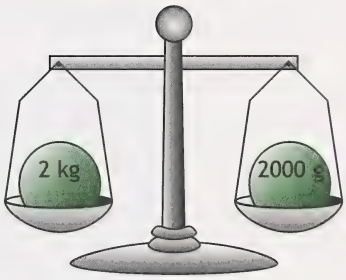
Mass is measured in **grams** and **kilograms**. The shortened form of kilogram is **kg**. The shortened form of gram is **g**.

1 kg = 1000 g

You can compare grams and kilograms.

If 1 kg is the same as 1000 g, then 2 kg is the same as 2000 g.

If 1 kg is the same as 1000 g, then 2.5 kg is the same as 2500 g.



16. a. 5 kg = _____ g **b.** 5.5 kg = _____ g

c. 3000 g = _____ kg **d.** 3400 g = _____ kg

Check your answers in the Appendix.

Money

It is important to understand how to add and subtract amounts of money. When you buy items, you need to know how much money to pay. You should also know how to give change.

Example

Dana is buying a new kite that cost $30.50. She gives the cashier a 25-dollar bill, a 10-dollar bill, and a 2-dollar coin. How much change will she get?

To count change, start with the cost of the item that is being bought, in this case $30.50. Skip count with coins or bills until you arrive at the amount that Dana gave the cashier.

The change is $1.50.

Time

Time is also organized into units of measurement.

60 seconds = 1 minute
60 minutes = 1 hour
24 hours = 1 day
7 days = 1 week
52 weeks = 1 year
365 days = 1 year
12 months = 1 year
10 years = 1 decade
10 decades = 1 century
100 years = 1 century
10 centuries = 1 millennium

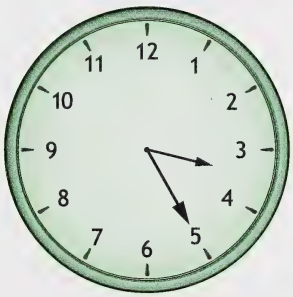
An analogue clock is divided into 12 sections. The sections show **hours** for the short hand and **minutes** for the long hand.

The short hand shows hours.

The long hand shows minutes.

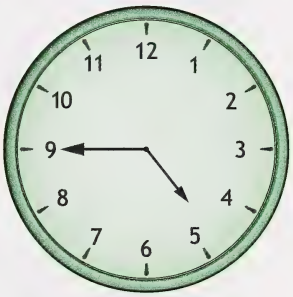
17. What times do the following clocks show?

a.



_____

b.

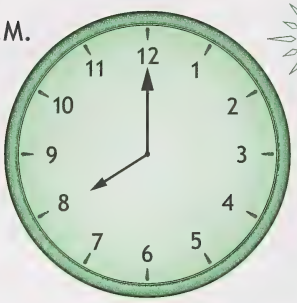


_____

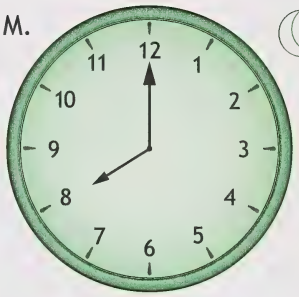
Check your answers in the Appendix.

To show nighttime or daytime, you write A.M. or P.M. You cannot show this on an analogue clock, but you can use a symbol like a moon ☾ to show P.M. times or a sun ☀ to show A.M. times.

8:00 A.M.



8:00 P.M.



Remember:

- From midnight (12:00 A.M.) until noon (12:00 P.M.) is called A.M. Perhaps you can remember this if you think A.M. means "at morning."
- From noon until midnight is called P.M. Perhaps you can remember this if you think P.M. means "past morning."

You have now completed a review of many of the ideas you first covered in Module 7: Measurement.

Turn to Assignment Booklet 9B, and complete the activities for Day 13.

Module 8 Review—Geometry

The world is filled with geometric shapes and figures of all sorts. Today's lesson will review many of the concepts of geometry that you learned in Module 8.

If you still have your collection of 3-D models, you may use them as you complete the activities in this lesson. You will also need a ruler.

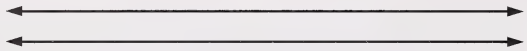
Lines

Lines can be curved or straight. Lines can be drawn with **endpoints** or **arrows** on the ends.

Line segment with endpoints

Line that extends in both directions

Lines that never meet and that are always the same distance from each other are called **parallel** lines.

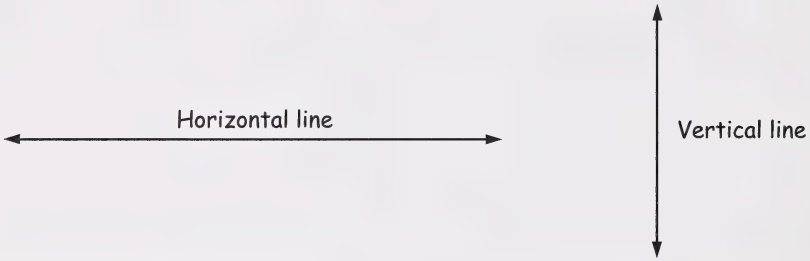


Railway tracks are an example of parallel lines.

Lines that cross each other are called **intersecting** lines.

Lines can also be **vertical** or **horizontal.**

Lines that go from one side to the other (left to right) are **horizontal**. Lines that go up and down are **vertical**.

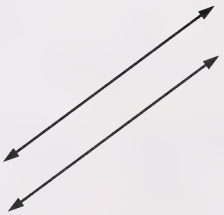


1. Write the correct name for each type of line.

a.

_____

b.



_____

c. 

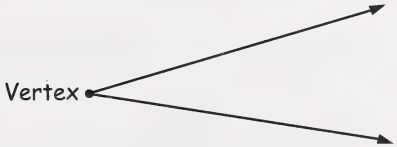
d.

_____ _____

Check your answers in the Appendix.

A **ray** is a line that has one endpoint.

When two rays meet at one point, an **angle** is formed.

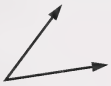


The point where the rays meet is called the **vertex**.

A **right angle** is an angle that forms a square corner.

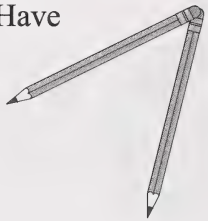
Lines that form right angles are **perpendicular** to each other.

Some angles are **smaller** than right angles.



Other angles are **larger** than right angles.

2. Use **two** pencils to do this activity. Place the pencils on your desktop and move them to make the following lines and angles. Have your home instructor observe you as you make different kinds of lines and angles.



- a right angle
- two perpendicular lines
- an angle smaller than a right angle
- an angle larger than a right angle

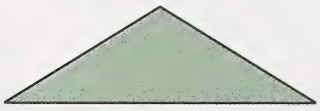
Check your answers in the Appendix.

Two-Dimensional Figures

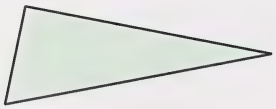
There are many different two-dimensional figures.

Polygons are two-dimensional figures with straight sides. You have learned about triangles, quadrilaterals, pentagons, hexagons, and octagons.

Triangles have three sides and three angles.



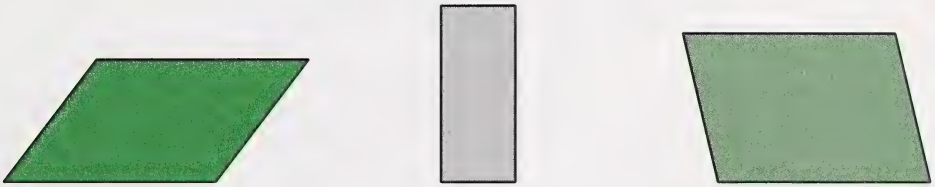
Right triangles have one right angle.



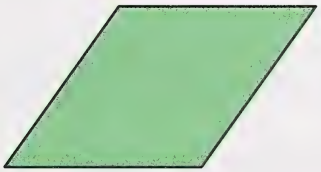
Four-sided figures are called **quadrilaterals**. Quadrilaterals have four sides and four corners.

Squares and **rectangles** have four right-angle corners and four sides.

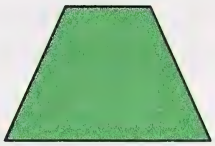
A **parallelogram** has opposite sides that are parallel to each other.



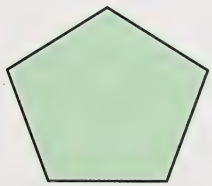
A **rhombus** is a parallelogram with four sides of equal length.



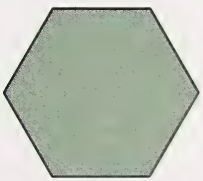
A **trapezoid** has one pair of parallel sides.



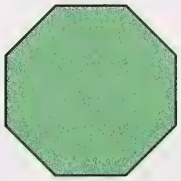
A **pentagon** has five sides.



A **hexagon** has six sides.

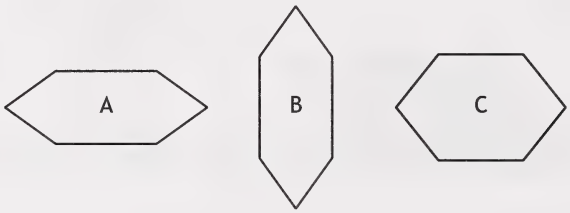


An **octagon** has eight sides.



Two-dimensional figures may be **congruent.**

Figures are congruent if they are identical in size and shape.

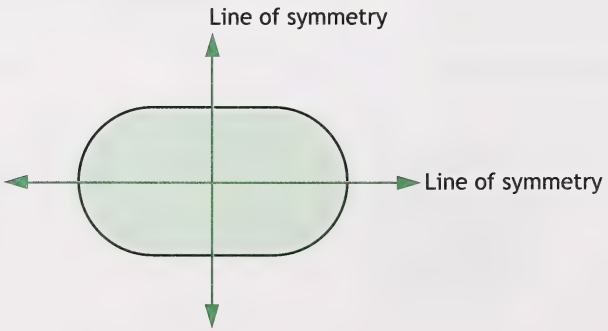


3. Which two figures above are congruent? _____ and _____

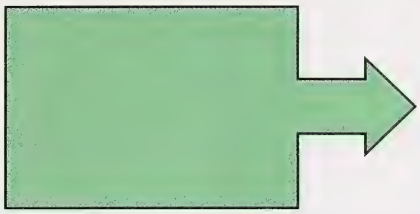
Check your answers in the Appendix.

Figures can be **symmetrical.**

Two-dimensional figures show symmetry if they can be divided into two parts that are mirror images of each other. The line that divides these two parts is the **line of symmetry**. Some figures have more than one line of symmetry.



4. Draw the line of symmetry on the figure below.

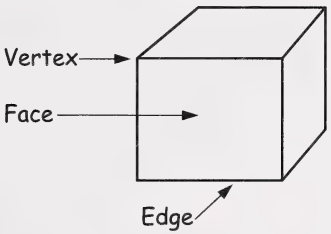


Check your answer in the Appendix.

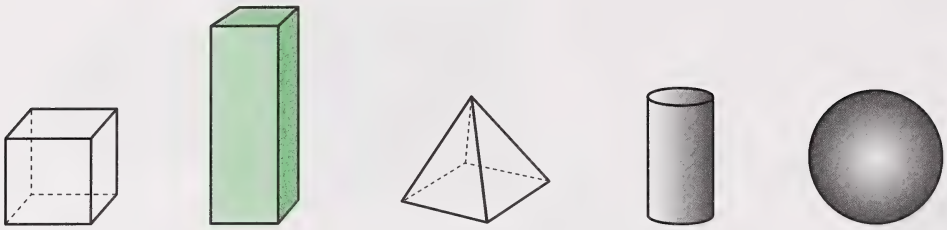
Three-Dimensional Solids

Three-dimensional solids are objects that have length, width, and height. A solid can be classified by looking at the number of **faces**, **edges**, and **vertices** it has.

- A **face** is a flat surface of a solid. Faces may be the shape of a polygon or a circle.
- An **edge** is where two faces meet. An edge forms a line.
- A **vertex** is a corner or point where three or more edges meet.



Examples of simple 3-D solids include the following:



Take out a few items from your collection of 3-D objects. Look at each one of them, noting the number of faces, edges, and vertices they have.

5. Choose one of the items. Write the name of the 3-D model or object and describe it by telling about the faces, edges, and vertices.

_____

_____

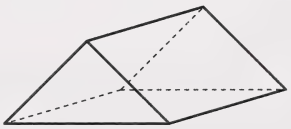
_____

Check your answer in the Appendix.

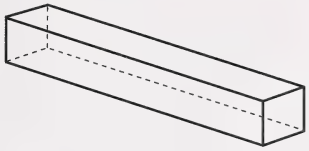
Prisms

Prisms have two bases or ends shaped like polygons. The other faces of a prism are rectangular. Prisms are named by the shape of their bases.

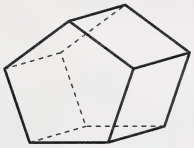
Prisms can have triangular bases.

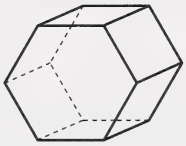


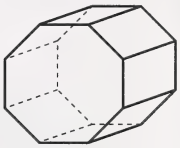
Prisms can have rectangular bases.



Prisms can also have pentagonal, hexagonal, or octagonal bases.







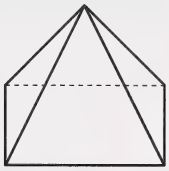
Do you have any prisms in your collection of objects? Practise naming them correctly, according to the shape of their bases. Get your home instructor to help you if you are unsure of the correct name.

Pyramids

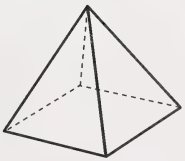
Pyramids have one base shaped like a polygon. The other faces of a pyramid are shaped like triangles.

A pyramid is named by the shape of its base.

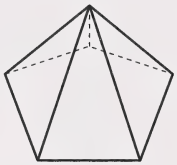
Pyramids can have rectangular bases.



Pyramids can have square bases.



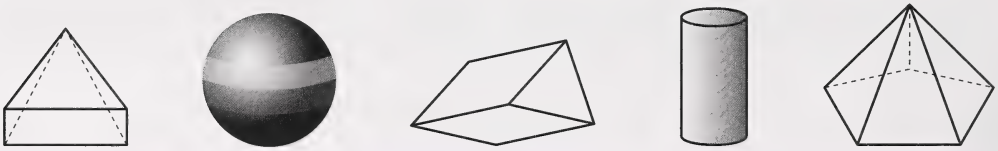
Pyramids can have pentagonal bases.



Do you have any pryramids in your collection? Practise naming them by noting the shape of their bases. Get help from your home instructor if you need to.

When you compare prisms and pyramids, you can think about how many **edges**, **faces**, and **vertices** they have. You can also consider whether they have any **parallel faces**, **parallel lines**, **right angle corners**, or **intersecting lines**.

6. **a.** Circle the pyramids in the following solids.
b. Put a rectangle around the prism.
c. Underline the sphere in the following solids.

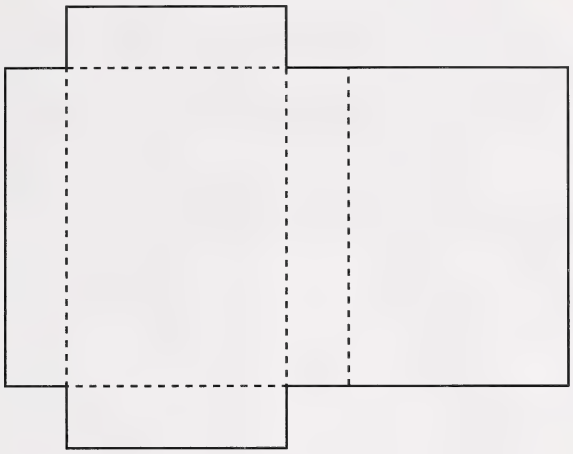


Check your answers in the Appendix.

Nets

Nets are patterns that can be used to make three-dimensional objects. If you were able to take apart a solid, but keep the faces connected, you would have a net. When a net is folded, it forms a 3-D solid.

This is a net for a rectangular prism. It has two rectangular bases.



When you look at a net for any 3-D solid, think about

- how many sections (or faces) the solid will have
- what shape the sections are
- what size the sections are

For example, a net for a cube will have six faces. Each face will be a square and each square will be the same size.

7. Think about (or look at an example in your collection) of a square-based pyramid.

a. How many bases does the pyramid have? _____

What shape is the base? _____

b. How many other faces does the pyramid have? _____

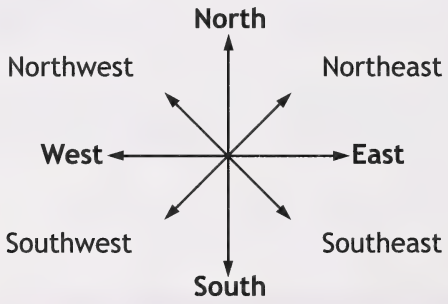
What shape are the other faces? _____

c. Use a ruler to help you draw a net for a square-based pyramid in the space below.

Check your answers in the Appendix.

Giving Directions

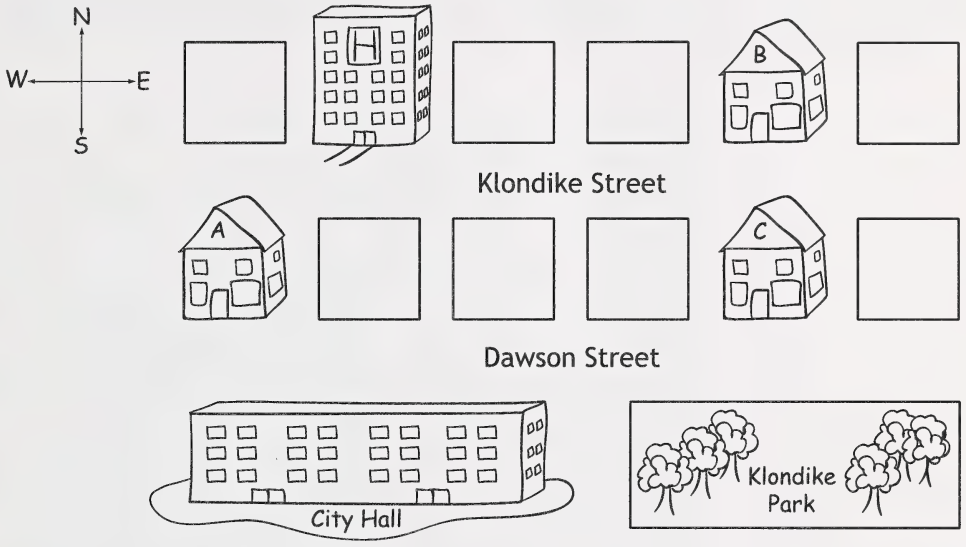
Knowing how to read and follow maps and grids allows you to find places and give directions.



It is important to know these direction words when reading maps and giving instructions about how to get to a certain place.

Maps

Maps show **directions**. They also show **places** such as roads, streets, buildings, rivers, oceans, mountains, parks, lakes, and airports. Many maps have a **legend** that tells about the symbols that are used on the map.



Legend: A, B, and C – houses along Klondike and Dawson Streets
H – hospital

8. Write the correct direction word (**north**, **south**, **east**, or **west**) in each blank.

a. The hospital is _____ of House B.

b. Klondike Park is _____ of City Hall.

c. Dawson Street is _____ of Klondike Street.

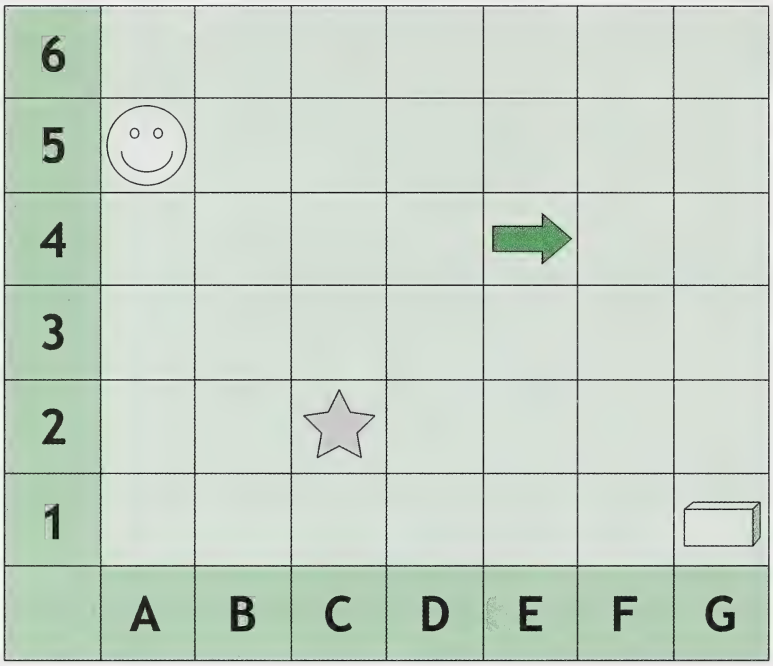
d. House B is _____ of House C.

Check your answers in the Appendix.

Grids

Grids help you find a place quickly. A grid is made of evenly spaced horizontal and vertical **lines** or **dots**. The directions **up and over** help locate places on the rows and columns.

The following grid below has six horizontal **rows** that are numbered 1 to 6. The grid has seven vertical **columns** that are lettered A to G.



9. Find the object that is at each location on the grid.

a. C 2 _____

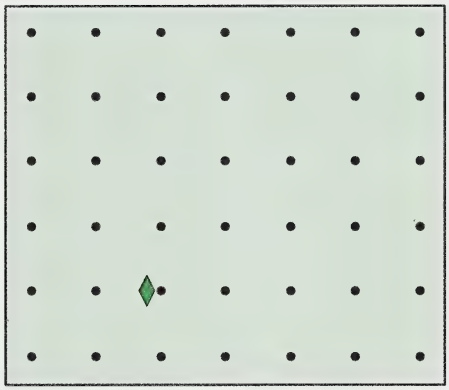
b. G 1 _____

10. Look at the previous grid and write the location of each of these objects.

a.  _____ **b.**  _____

Check your answers in the Appendix.

11. Review how to create a **path** or **route** on a grid.



Start at the diamond.

- Go 4 spaces **north** of the diamond
- Go 2 spaces to the **east**.
- Go 4 spaces to the south.
- Draw a star here.

Check your answers in the Appendix.

Turn to Assignment Booklet 9B, and complete the activities for Day 14.

Congratulations!

You have completed Mathematics 4!

COURSE SURVEY FOR MATHEMATICS 4
(© 2000)

After you have completed the assignments in this course, please fill in this questionnaire. Your honest thoughts about the course are appreciated. They will help improve the course for future students. Please mail the completed questionnaire to the address given on the last page.

Part A: About Yourself

Your name: _____

Your age: _____

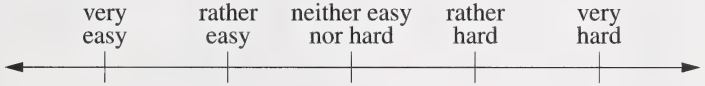
Your distance education school: _____

Your distance education student number: _____

Part B: About the Course

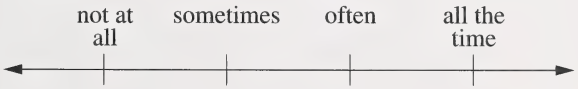
On each line, print an "X" under the words that describe what you think.

1. How difficult did you find this course?

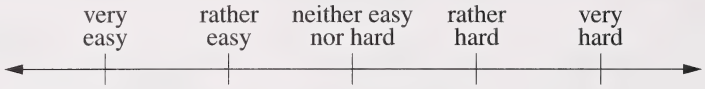


2. How well could you follow the instructions and explanations in the modules?

3. The Internet may have been mentioned in your course as an optional research tool or for optional activities. How often did you use the Internet to complete this course?



4. How easy or hard was the Internet to use as directed by the instructions in this course?



5. If someone helped you with parts of the course, answer the following questions:

   a. Who helped? (parent, friend, etc.) _____

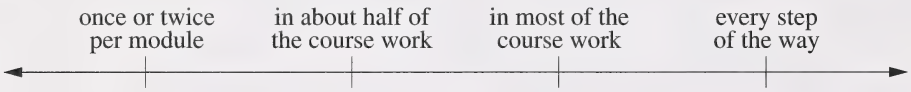
   b. What did this person do to help? _____

   _____

   c. In which parts did this person help you the most? _____

   _____

   d. How much did this person help you?



6. The best thing about this course is _____

   _____

   _____

   _____

7. The part of this course that needs improving most is _____

   _____

   _____

   _____

8. Tell us any other ideas that you that would improve this course.

_____

_____

_____

_____

_____

9. If you have completed or almost completed another distance education (DE) course within the past year, complete the following chart. If you have done a few distance education courses recently, please choose a course that is similar to this course.

   Print the names of the courses in the following chart. Then put a check mark (✓) in each column to show what you think.

Comparison Between DE Courses	Took More Time	Was More Difficult	Was Better Written	Was More Enjoyable
Name of this course:				
Name of other DE course:				

Thanks for taking the time to complete this questionnaire. Your feedback is important to us. Please return this questionnaire to the address on the right.

Learning Technologies Branch
Box 4000
Barrhead, Alberta
T7N 1P4

If you are enrolled at the Alberta Distance Learning Centre and have been mailing your Assignment Booklets to ADLC, you may return this questionnaire with the final Assignment Booklet in the course.

Appendix

Glossary

chance: to happen by accident; an opportunity

event: something that happens; an occurrence

outcome: the end result of an event or happening

probable: likely; almost sure to happen

probability: the study of chance events; making predictions on the likelihood of certain events or outcomes happening

tally: a quick way of recording results by using simple line marks

trial: a series of events in an experiment that helps to test a prediction

Answer Key to Self-Marking Activities

Day 1: What Is Most Likely to Happen?

1. **a.** Your coin probably landed on heads 4, 5, or 6 times.
   b. It is **likely** that the coin will fall with the heads side showing.

2. **a.** Your coin probably landed on tails 4, 5, or 6 times.
   b. It is **likely** that the coin will fall with the tails side showing.

3. **a.** Your coin probably landed on the edge zero times.
   b. It is **unlikely** that the coin will land on its edge.

4. Your answer should tell about a chance you took in the past week. Some examples are given:

   - You used a toy or game that was slightly damaged. You took a chance that it wouldn't break completely.

   - You borrowed your brother's or sister's clothes and took the chance that they wouldn't get ripped or dirty before you returned them.

- You bought a ticket on a raffle. You hope your name will be drawn to win the prize.

Check with your home instructor if you are unsure about your answer.

5. **a.** unlikely
b. likely
c. unlikely
d. likely
e. unlikely

6. Your answers should include things that are unlikely to happen to you. Some examples are given.

- The premier will ask you to visit the Legislature.
- A TV crew will interview you about your hobby.
- You will find a lost wallet on your way to the store.

Check with your home instructor if you are unsure of your answers.

7. **a.** possible **b.** impossible
c. possible **d.** impossible

8. Your answer should talk about an impossible event. Some examples are given.

- I will become a doctor of medicine by my tenth birthday.
- There will be grapes growing on my neighbour's apple tree next spring.
- I will pull a yellow cube out of a bag of red and blue cubes.
- My dog will drive my friends to the movie theatre in my parents' truck.

9. Addition Number Facts

13	12	12	10	18
13	14	11	11	12
16	9	13	15	12
11	11	10	11	15
12	13	12	10	14

10. Subtraction Number Facts

6	9	8	7	8
5	7	8	8	1
7	6	5	9	9
6	8	2	6	9
7	7	9	9	5

Day 2: Outcomes and Predictions

1. a. Your answer could be similar to one of these:

- Your parents refuse to raise your allowance.
- Your parents agree to raise your allowance.
- Your parents talk to you about your responsibilities in earning an allowance.

b. You draw a ring or a toy animal.

c. You roll either a 1, 2, 3, 4, 5, or 6.

2. a. You pick a fruit snack.
b. You get the sum of 13.
c. You will draw out only blue marbles.

3. a. True. All the numbers on the cube are between 1 and 10.

b. True. It is possible to roll an even number.

c. True. There are only numbers smaller than 7 on the cube.

d. False. You have to roll either an odd number or an even number.

e. False. You have an equal chance of rolling a 1, 2, 3, 4, 5, or 6. You are not more likely to throw a 4.

f. False. You have an equal chance of rolling a 1, 2, 3, 4, 5, or 6. You do not have a better chance of rolling a 1.

4. a. and **b.** Depending on what numbers you rolled, your scores will show some 3s and some 1s. Your tally chart may look something like the one shown.

	Outcome of 3	Outcome of 1
Trial A	///	////

5. If you had more 3s than 1s, the prediction is correct for this trial. If you had fewer 3s than 1s, the prediction is not correct for this trial. If you had an equal number of 3s and 1s, the prediction is not correct.

6. **a.** and **b.** Your scores may be different than in Trial 1. Your tally will likely show some 3s and some 1s.

7. **a.** and **b.** Your total scores will depend on your answers to questions 4 and 6.

8. The prediction might be correct if your total number of 3s was greater than the total number of 1s. It would then seem that, in two trials or tests, you are more likely to roll a 3 than a 1.

   The prediction might not be correct this time if your total number of 3s is less than your total 1s. It would then seem that, in two trials or tests, you are less likely to roll a 3 than a 1.

   If your total number of 3s is equal to your total number of 1s, then the prediction is not correct.

   Note: If you could do enough trials, you would find that you have an equal chance of rolling a 1 or a 3; therefore, the prediction is incorrect.

9. It most likely will not hail. There is only a small chance (10%) of hail.

10. There is an equal chance (50–50) of strong winds or no strong winds. (Maybe it will be windy or maybe it won't.)

11. It is certain to be a sunny day.

Day 3: Probability and Spinners

1. The arrow should have pointed to either a 1, 2, 3, 4, 5, or 6.

2. Depending on your answer to question 1, the other possible outcomes are 1, 2, 3, 4, 5, and 6.

3. **a.** impossible
b. possible
c. possible
d. certain
e. unlikely, uncertain

4. The probability of the arrow pointing to yellow is 1 out of 4 or $\frac{1}{4}$.

5. The probability of the arrow pointing to a green section is 1 out of 4 or $\frac{1}{4}$.

6. No. The arrow is equally likely to point to any section of the spinner because they are all the same size.

7. Blue. The blue section is larger than the white section so the arrow is more likely to point to the blue.

8. $\frac{1}{6}$

9. $\frac{4}{6}$

10. The arrow is more likely to point to a 3 because 3 has twice as much space on the spinner as 4.

11. Multiplication Number Facts

18	27	45	28	18
21	49	32	20	40
25	42	35	36	28
36	40	30	56	16
54	36	27	24	42

Day 4: Games, Hidden Outcomes, and Probability

1. I am more likely to pick Colour **A** than Colour **B**.

2. If you predicted that you would pick Colour A more often, and had more than $\frac{5}{10}$ for Colour A, then your prediction was correct.

3. If you predicted that you would pick Colour A more often, and had more than $\frac{5}{10}$ for Colour A, then your prediction was correct.

4. You could estimate how many of each colour are in the bag by picking the items and recording them.

5., 6., and **7.** Ask your home instructor to help you check these questions. The results of your trials will determine the answer to these questions.

Home Instuctor: Please check to see that the student's results are tallied correctly, the fraction out of 10 is shown, and the estimate is reasonable.

8. **Quest 2000** Page 251

1. The first game played with the reeds is based only on luck. It is only by chance that a player will guess in which hand the reed can be found.

2. The game with the wooden ball requires some skill. If a player practises improving the way the ball is dropped into the shell, he or she may be able to win the game.

9. The game is not fair. There is less of a chance of getting a blue marble (probability $\frac{2}{10}$). The probability of getting a green marble is $\frac{8}{10}$, or **four times** as much as for getting a blue marble.

10. The person drawing green marbles will likely get to ten points more quickly than the person drawing blue marbles.

11. To make the game fair, blue marbles should get four points and green marbles should get one point, or there should be five marbles of each colour.

12. Division Number Facts

5	3	4	6	6
3	9	5	6	8
5	5	5	4	4
3	7	9	7	9
8	7	8	5	6

Day 5: Putting It All Together

All activities are to be done in Assignment Booklet 9A. This work will be marked by your teacher.

Day 6: Assessing What You Know

All activities are to be done in Assignment Booklet 9A. This work will be marked by your teacher.

Day 7: Module 1 Review—Data Management

1. This question allows too many choices. There could be thousands of responses to this question. The restaurant owner would not be able to make a good choice for the kind of restaurant to open—he would have to offer too many different foods in his restaurant.

2. Your answer should indicate that a variety of people should be chosen for a random sample. You would perhaps survey children (an equal number of boys and girls), teenagers, young adults, older adults, senior citizens, business people, people who work at home, trades people, travellers, and people from many ethnic groups.

3. **a.** Seven people chose fast food.
b. Five people chose soup and sandwiches.
c. Thirty-three people answered the survey questions.

4. Thirty people were surveyed in all.

5. Four people visited a restaurant three times in the last month.

6. Thirty-three men visited the restaurant.

(11 symbols $\times 3 = 33$)

7. Multiplication Number Facts

21	54	56	45	14
48	36	25	48	24
54	35	32	81	42
36	72	32	42	18
28	20	64	15	24

8. Division Number Facts

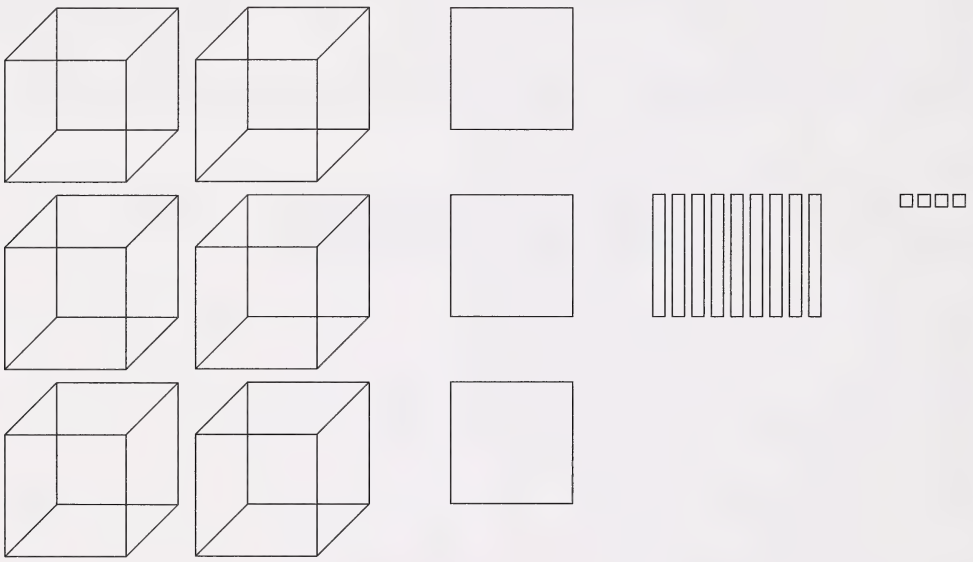
8	9	4	4	9
9	8	9	7	8
3	8	5	8	9
7	5	3	6	7
9	7	6	5	5

Day 8: Module 2 Review—Number Concept and Patterns

1. Have your home instructor help you with the answers. The estimate should be reasonably close to the real count. Your strategy may have been to make groups of objects and then quickly guess about how many groups you had. Some adding or multiplying may have been needed to give a reasonable estimate.

2. Your actual count may be less than or greater than the estimate. It is not likely that your estimate will be exactly the actual number of objects on the table.

3. **a.** Your base ten drawing should be similar to the one shown.



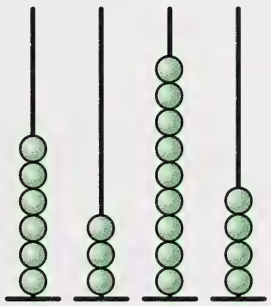
b. six thousand three hundred ninety-four

c. $6394 = 6000 + 300 + 90 + 4$

d. Many answers are possible. Some examples are provided. Have your home instructor check your answer if it is different from the ones shown here.

TH	H	T	O
6	3	9	4
6	2	19	4
6	1	29	4
6	3	8	14
6	3	7	24
5	13	9	4
5	13	8	14

e.



4. a. **54 321** is the largest possible number.

b. **12 345** is the smallest possible number.

c. Many answers are possible. Have your home instructor check your four numbers to make sure they are in order from largest to smallest.

5. a. 600 **b.** 6000 **c.** 60

6. 3960

7. 6400

8. 4000

9. a.
- 8 players + **4** = **12** pizzas
- 10 players + **5** = **15** pizzas
- 12 players + **6** = **18** pizzas
- 14 players + **7** = **21** pizzas

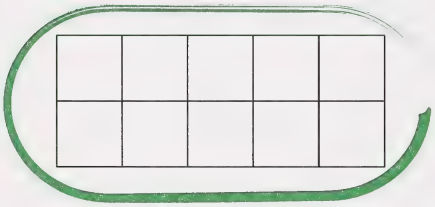
b. Answers will vary. You might have described the pattern rule in one of the following ways:

- Each time the number of players increases by two, the number of pizzas increases by three.
- The number of pizzas is found by adding the number of players **plus** half the number of players.

10. 30 cm

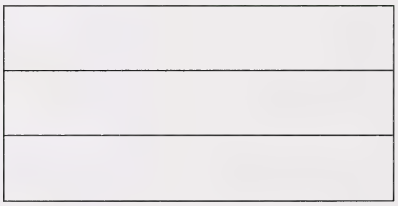
Day 9: Module 3 Review—Fractions and Decimals

1.



2.

or



3. Four out of five stars should be shaded.

4. Two out of three parts should be shaded.

5. a. $\frac{6}{10}$ **b.** $\frac{2}{3}$ **c.** $\frac{1}{6}$

6. a.

Hundreds	Tens	Ones	Tenths
	2	5 .	6

b. The number 25.6 means **2** tens, **5** ones, and **6** tenths.

7. a. six tenths or $\frac{6}{10}$

b. 6

8. six hundred thirty-nine and five tenths

9. a. 40

b. four tenths or $\frac{4}{10}$

c. four hundredths or $\frac{4}{100}$

10. $\frac{6}{10}$ 0.6

11. a. 0.3 **b.** 0.35 **c.** 0.78

12. a. $\frac{46}{100}$ **b.** $\frac{5}{10}$ **c.** $\frac{9}{100}$ **d.** $\frac{37}{100}$

13. a. sixty-two hundredths
b. ninety-nine hundredths
c. eight hundredths

14. Any three of the answers provided are correct.

a. $\frac{1}{10}$, one tenth, 0.1, $\frac{10}{100}$, ten hundredths, 0.10

b. $\frac{20}{100}$, twenty hundredths, 0.20, $\frac{2}{10}$, two tenths, 0.2

Day 10: Module 4 Review—Addition and Subtraction

1. $7+9+5$ is the same as $\mathbf{9+5+7}$, $\mathbf{5+9+7}$, $\mathbf{9+7+5}$, or $\mathbf{5+7+9}$.

2. a. $13-\textcircled{8}=5$ $\quad 13-5=8$, $8+5=13$, $5+8=13$

b. $\textcircled{14}-5=9$ $\quad 9+5=14$, $5+9=14$, $14-9=5$

c. $3+\textcircled{9}=12$ $\quad 12-9=3$, $12-3=9$, $9+3=12$

d. $\textcircled{6}+9=15$ $\quad 15-9=6$, $15-6=9$, $9+6=15$

3. a.
$$\begin{array}{r} {\scriptstyle 1\,1} \\ 358 \\ +\ 63 \\ \hline 421 \end{array}$$

b.
$$\begin{array}{r} {\scriptstyle 1\,1} \\ 274 \\ +\ 178 \\ \hline 452 \end{array}$$

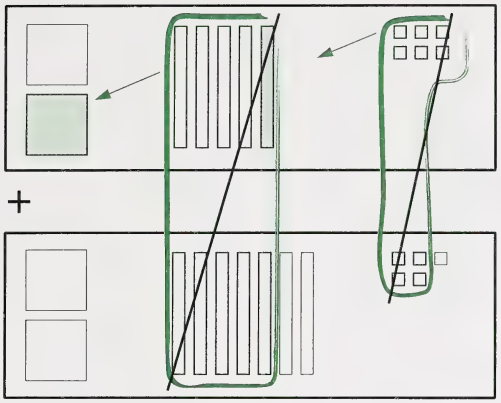
c.
$$\begin{array}{r} {\scriptstyle 1} \\ 946 \\ +\ 244 \\ \hline 1190 \end{array}$$

4. a.
$$\begin{array}{r} {\scriptstyle 7\,1\,0} \\ 8\not{0}5 \\ -\ 533 \\ \hline 272 \end{array}$$

b.
$$\begin{array}{r} {\scriptstyle 4\,1\,3} \\ \not{5}\not{3}2 \\ -\ 162 \\ \hline 370 \end{array}$$

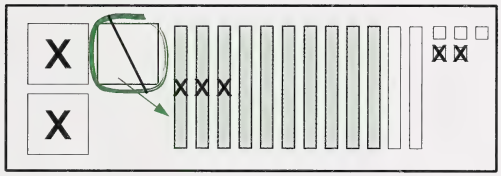
c.
$$\begin{array}{r} {\scriptstyle 5\,17\,14} \\ \not{6}\not{8}\not{4} \\ -\ 599 \\ \hline 85 \end{array}$$

5. a.



= 421

b.



= 093

6.

$$\begin{array}{r} 486 \\ +\ 592 \\ \hline 1088 \end{array} \qquad \begin{array}{r} {\scriptstyle 9\ 18} \\ 10\not{8}8 \\ -\ 592 \\ \hline 496 \end{array}$$

The solution is **incorrect**.

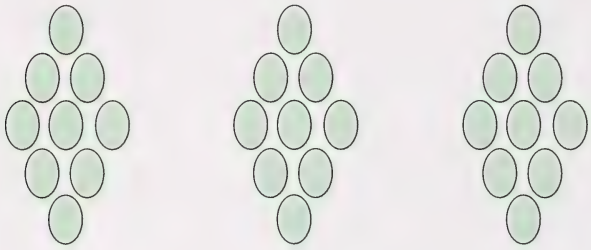
7. $38.59

Day 11: Module 5 Review—Multiplication

1. Addition sentence: $7+7+7+7=28$

Multiplication sentence: $4\times 7=28$

2. Your sketch should look similar to this.



3. $(12) \times (5) = 60$

4. $32 \times 2 = (64)$

5. **a.** $6 \times 7 = 7 \times 6 = 42$
b. $8 \times 5 = 5 \times 8 = 40$

6. Your array should be similar to this.

$4 \times 6 = 24$

7. $(30 \times 14) \times 7 = 30 \times (14 \times 7)$

$420 \times 7 = 30 \times 98$

$2940 = 2940$

8. **a.** $13 \times 0 = 0$ **b.** $9 \times 1 = 9$
c. $0 \times 25 = 0$ **d.** $1 \times 32 = 32$

9. a. $63 \times 10 = 630$ **b.** $96 \times 100 = 9600$ **c.** $1000 \times 8 = 8000$

10. a. 90 **b.** 300 **c.** 120 **d.** 600

11. a. 700 **b.** 1700 **c.** 8000 **d.** 10 000

12. $27 \times 4 = (20 + 7) \times 4$

$= (20 \times 4) + (7 \times 4)$

$= 80 + 28$

$= 108$

13. a.
$$\begin{array}{r} {\scriptstyle 4} \\ 58 \\ \times\ \ 6 \\ \hline 348 \end{array}$$

b.
$$\begin{array}{r} {\scriptstyle 4} \\ 29 \\ \times\ \ 5 \\ \hline 145 \end{array}$$

14. a.
$$\begin{array}{r} {\scriptstyle 13} \\ 127 \\ \times\ \ 5 \\ \hline 635 \end{array}$$

b.
$$\begin{array}{r} {\scriptstyle 76} \\ 298 \\ \times\ \ 8 \\ \hline 2384 \end{array}$$

c.
$$\begin{array}{r} {\scriptstyle 14} \\ 426 \\ \times\ \ 7 \\ \hline 2982 \end{array}$$

15.
$$\begin{array}{r} {\scriptstyle 3} \\ 24 \\ \times\ \ 9 \\ \hline 216 \end{array}$$

$9 \times 24 = 216$

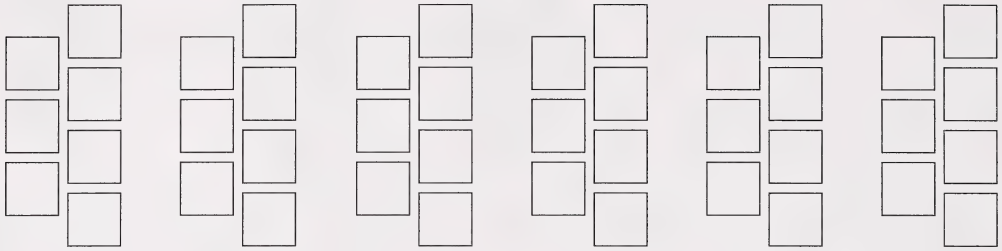
Jana had 216 toys in all.

Day 12: Module 6 Review—Division

1. a. $30 \div 5 = 6$ **b.** $21 \div 3 = 7$

2. $56 \div 8 = 7$

3. Your picture should look similar to this.



$42 \div 7 = 6$

4. $50 \div 5 = 10$

You could buy ten chocolates.

5. $6 \times 5 = 30$

6. $20 \div 5 = 4$

7. $13 \div 4 = 3$ R 1

8. $51 \div 8 = 6$ R3

$8 \times 6 = 48$
$48 + 3 = 51$

The answer is correct.

9. **a.** 4 **b.** 10 **c.** 9

10. a. 40 **b.** 72 **c.** 984

11. a. 1 **b.** 0 **c.** 1 **d.** 0

12. a. 65 **b.** 83

13. a. 30 **b.** 400

14. The closest fact is $54 \div 9 = 6$.

$$\begin{array}{r} 9 \\ 6\overline{)59} \\ -\ 54 \\ \hline 5 \end{array}$$

$59 \div 6 = 9$ R5

15.

$$\begin{array}{r} 15 \\ 6\overline{)92} \\ -\ 6\downarrow \\ \hline 32 \\ -\ 30 \\ \hline 2 \end{array} \leftarrow \text{Remainder}$$

$92 \div 6 = 15$ R2

Day 13: Module 7 Review—Measurement

1. Your answer should be similar to one of these objects:

- a doorway
- the height of the ceiling
- the height of a window
- the height of a wall
- the height of a ladder

2. Your answer should be similar to one of these: the distance from your home to a town or city, or the distance between two towns, cities, or provinces.

3. The line is **10** centimetres long.

4. a. 28 metres = 28 m
b. 95 millimetres = 95 mm

5. a. 4 cm = **40** mm **b.** 80 mm = **8** cm

6. 5 cm 50 mm

7. **a.** millimetres
b. centimetres
c. kilometres

8. Your estimate should be within 2 or 3 cm of the actual measurement.

9. **a.** $38\ \text{mm} = 3.8\ \text{cm}$ **b.** $933\ \text{cm} = 9.33\ \text{m}$

10. **a.** $7.4\ \text{m} = 740\ \text{cm}$ **b.** $6.1\ \text{cm} = 61\ \text{mm}$

11. The perimeter is 20 m.

$$6 + 6 + 4 + 4 = 20$$

The amount of baseboard needed is **20** m.

12. $3\ \text{m} \times 6\ \text{m} = 18\ \text{m}^2$

The area is $18\ \text{m}^2$.

13. Items that hold more than 1 L could be an ice cream pail, a swimming pool, a water jug, or a jerry can for gasoline. Many other answers are possible.

Items that hold less than 1 L could be a glass of water, a soup can, a tube of toothpaste, or a bottle of cough syrup. Many other answers are possible.

14. Eight cups would fill a 2-L container.

$$8\ \text{cups} \times 250\ \text{mL} = 2000\ \text{mL} = 2\ \text{L}$$

15. **a.** In 3 L there are **3000** mL.
b. In 4.6 L there are **4600** mL.
c. In 4000 mL there are **4** L.
d. In 5200 mL there are **5.2** L.

16. a. 5 kg = 5000 g **b.** 5.5 kg = 5500 g
c. 3000 g = 3 kg **d.** 3400 g = 3.4 kg

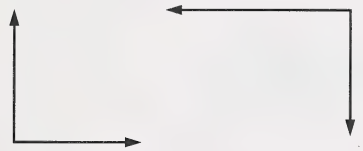
17. a. 3:25 **b.** 4:45

Day 14: Module 8 Review—Geometry

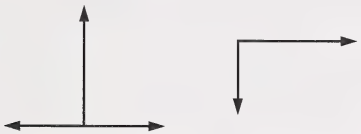
1. a. intersecting lines **b.** parallel lines
c. vertical lines **d.** horizontal line

2. Your angles should look like the following samples.

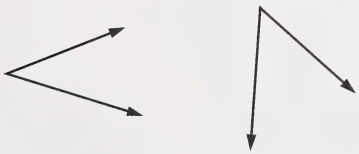
- right angles



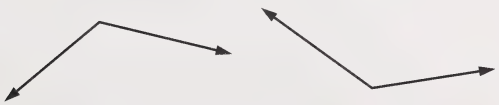
- two perpendicular lines



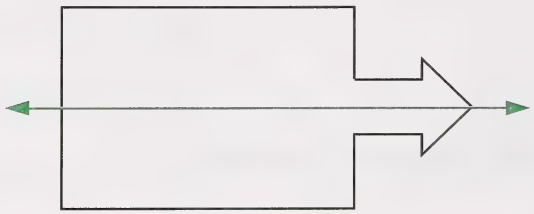
- an angle smaller than a right angle



- an angle larger than a right angle



3. Figures **A** and **B** are congruent.

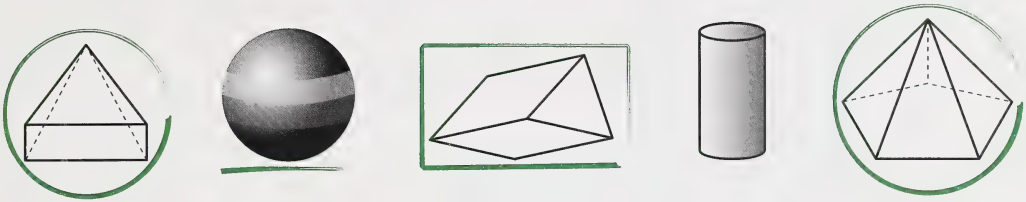
4. 

5. Depending on your choice of object, you will have a description that tells about the number of triangular, square, rectangular, or circular faces that are found on your object. You will also tell how many edges (straight lines) there are and how many corners (points where edges meet) there are.

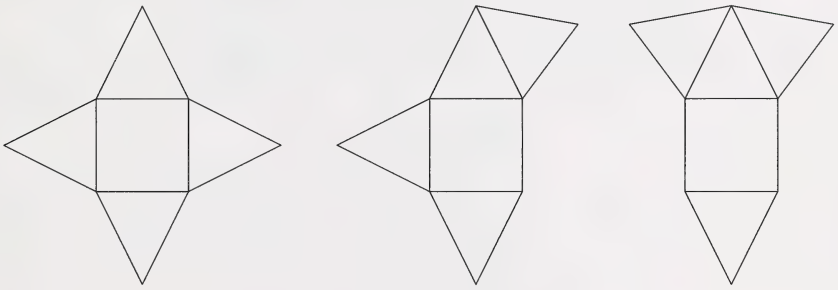
   Use this chart to help you.

Object	Faces	Edges	Vertices
Cube	6 squares	12	8
Rectangular Prism	6 rectangles	12	8
Pentagonal Prism	5 rectangles 2 pentagons	15	10
Hexagonal Prism	6 rectangles 2 hexagons	18	12
Octagonal Prism	8 rectangles 2 octagons	24	16
Square-based Pyramid	1 square 4 triangles	8	5
Rectangular-based Pyramid	1 rectangle 4 triangles	8	5
Pentagonal-based Pyramid	1 pentagon 5 triangles	10	6

6. **a.**, **b.**, and **c.**



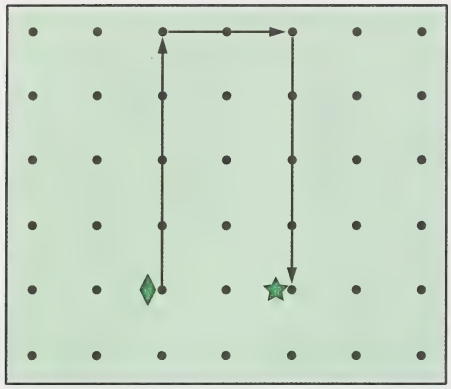
7. **a.** 1 base The base is **square**.
b. 4 other faces The faces are **triangular**.
c. Your net should be similar to these examples.



8. **a.** The hospital is **west** of House B.
b. Klondike Park is **east** of City Hall.
c. Dawson Street is **south** of Klondike Street.
d. House B is **north** of House C.

9. **a.**  **b.** 

10. **a.** E4 **b.** A5

11. 

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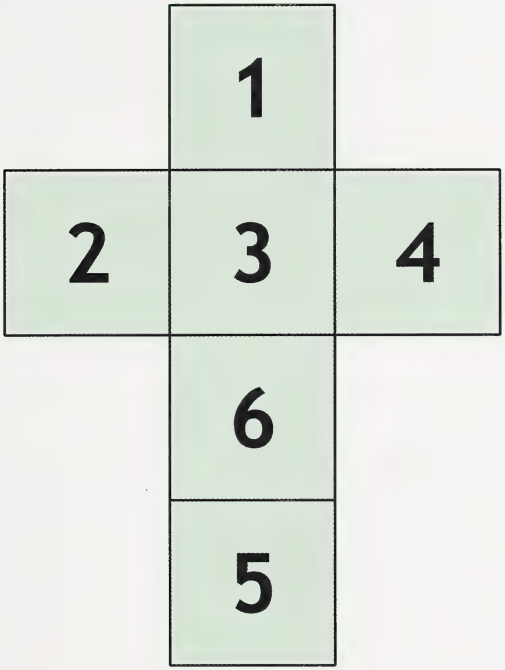
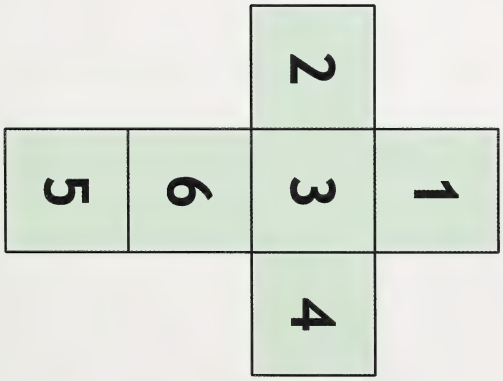
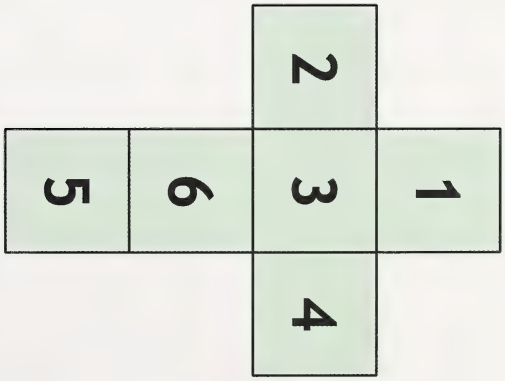
Day 2: Number Cubes

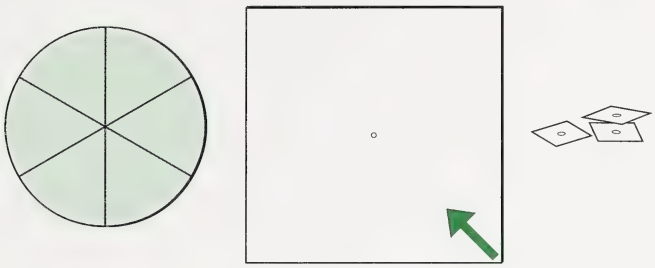






Day 3: Large Spinner

- Cut out the circle, the large square, and the three small squares.



- Bend up the outside end of a paper clip so that it points straight up when you lay it flat on your desk.

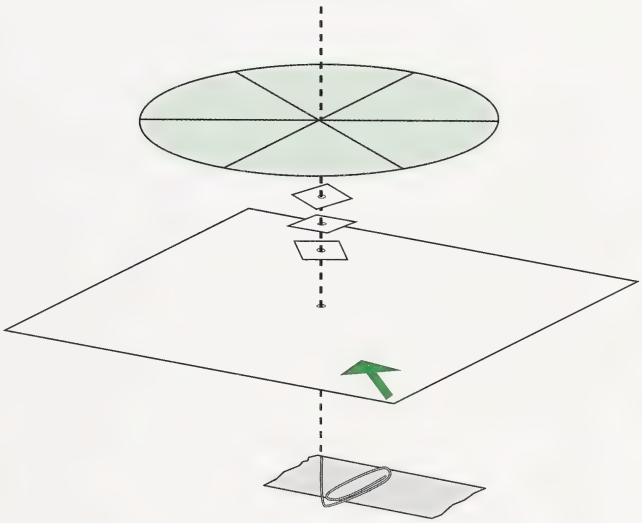
- Use a small nail or pin to poke holes through the middle of the large square and the three small squares (the washers).

- Poke the straight end of the paper clip through the hole in the large square. Tape the paper clip to the bottom of the square so it doesn't move.

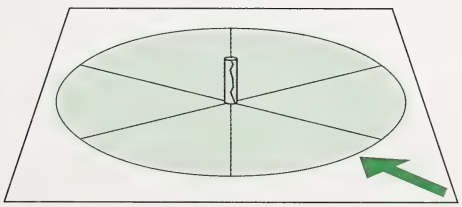
- Put the three small squares on the straight end of the paper clip.

- Put the circle on the straight end of the paper clip.

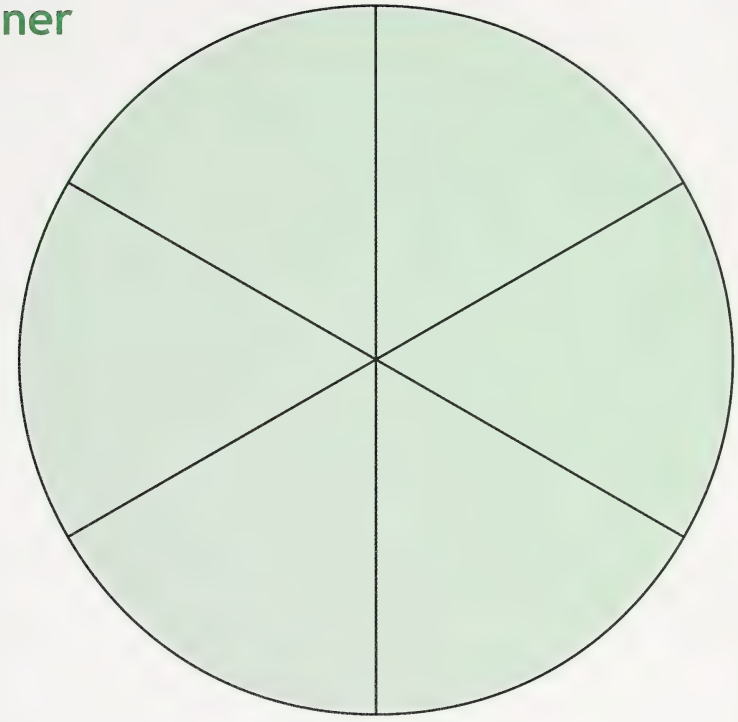
- Wrap the straight end of the paper clip with tape or a band-aid so that it is not so sharp.

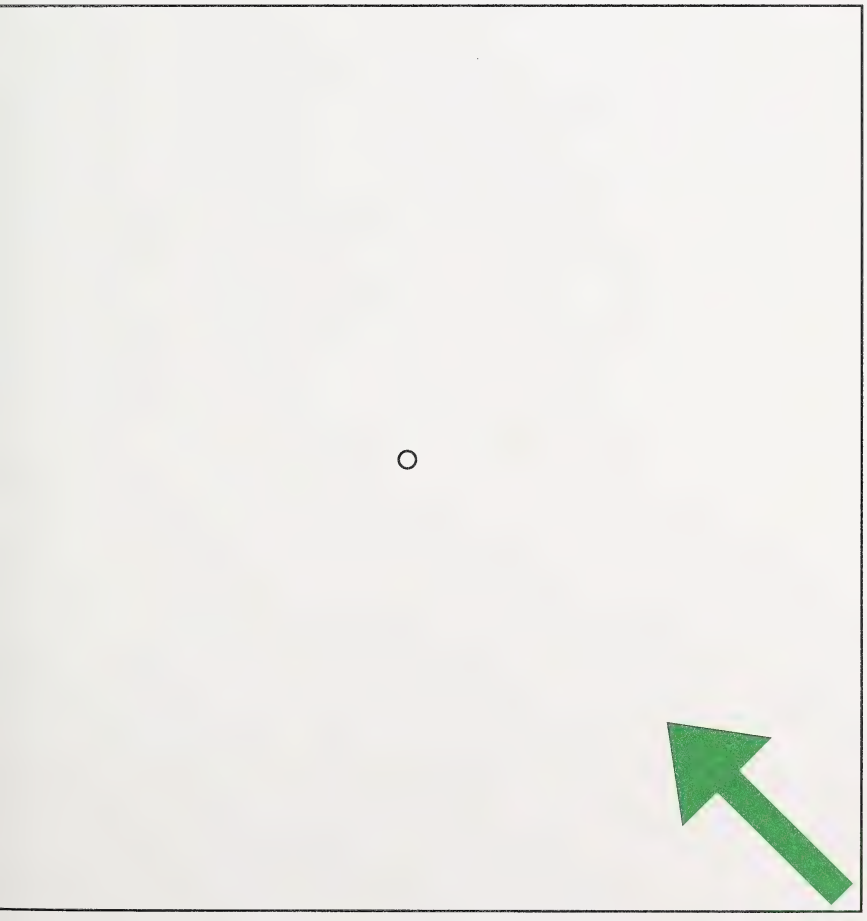


- Use your finger to spin the wheel. The arrow shows you what number to read.



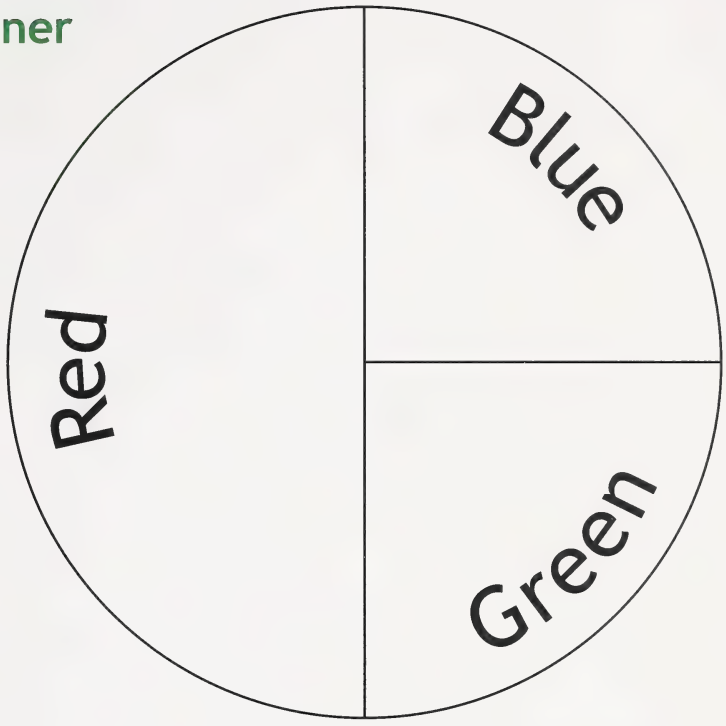
Day 3: Large Spinner



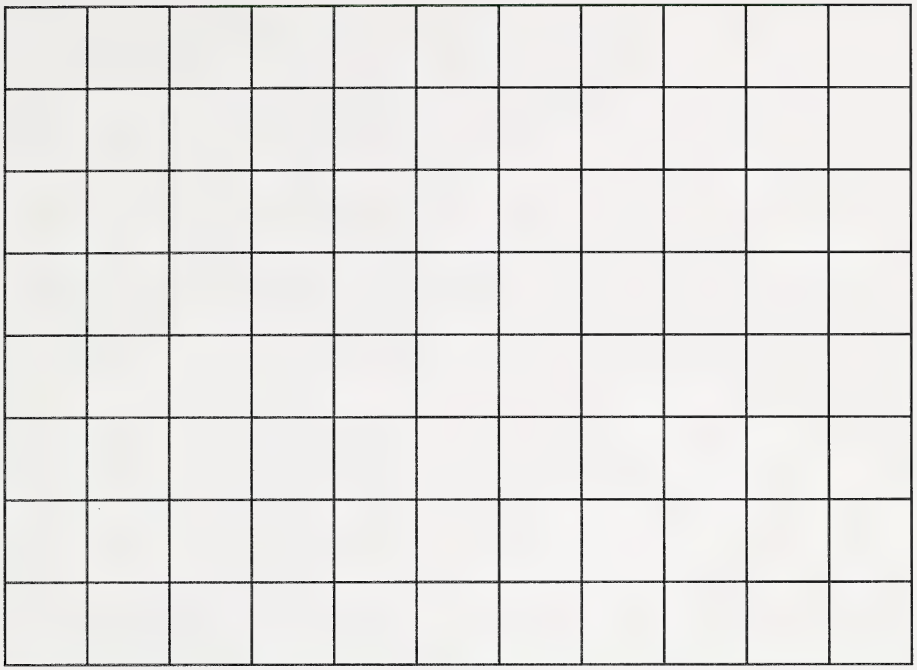


Day 3: Small Spinner

Make this smaller spinner in the same way as the first larger spinner was made. Colour the sections.



Day 4: Racing Squares Game



Finish Line										
2	3	4	5	6	7	8	9	10	11	12

Number Facts Progress Chart for Module 9

Your Score

25

20

15

10

5

+	-	×	÷	×	÷
Day 1	Day 1	Day 3	Day 4	Day 7	Day 7

Mathematics 4
Student Module Booklet
Module 9

2000